Competence Management Strategies (CMS)

A Future Concept in Competence Management for Knowledge-Based Organizations

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ABSTRACT

Competence is the driving force behind the success of any business. This is particularly true, as it pertains to knowledge-based organizations. Consequently, the management of the competencies of an organization's members is of vital importance, and is an integral aspect of managerial activities in these organizations. The objective of this thesis is to introduce and explore the idea and concept of developing formulated strategies – Competence Management Strategies (CMS), as it were – to assist in addressing the specific needs of competence managers in these innovative work environments. The focus of this research literature study centers on the following research questions: *What components are today's competence systems comprised of, and how can the use of competence systems be enhanced to provide even better support in the management of organizational competence? On what strategy or strategies for competence systems development might future research focus?* This study is based on a literature review of two doctoral dissertations; one on competence systems, and the other on knowledge creation and management and on interest activation. Based on the analysis and evaluation of these materials, this thesis presents a discussion, and conclusions are drawn, which articulate the potential, feasibility, and probable necessity of an innovative unified strategy approach to the management of organizational competence.

Keywords

Competence, competence management, concept, strategy, knowledge, innovative

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1 INTRODUCTION

In knowledge-based organizations, there is an acute awareness of the need for emphasis on competence management and development. The overall business success and the survival of these organizations is dependent on prompt, readily accessible, accurate, and current information concerning the competence preparedness and availability of its intellectual workforce. Even the tapping of individuals' various interests that might further motivate organizational members to develop and enhance their competencies must be facilitated. Undetected emerging competencies, or perhaps hidden (or merely yet-undiscovered) interests or competencies, among these individuals, are important bits and pieces of tacit information. An organization whose business strategy is the acquisition and the assimilation of knowledge would be wise to explore or investigate these viable resources.

These are but a few of the challenges to be addressed by competence managers. The need for this heightened awareness, therefore, places extremely high demands on the strategies and information systems that are employed to access this highly pertinent information and to manage these vital responsibilities. In addition, the enlisted strategies and systems need also address the on-going competence development needs of the organizational members themselves, e.g. the need for stimulation and interaction.

A recent Informatics research study showed that competence is perceived as being "complex and multifaceted". Three illustrative categories were presented (Lindgren, Stenmark, Bergquist & Ljungberg, 2002):
:

- *Competence*, as a formalized merit
- *Interest*, as a complement to competence
- *Interest*, as it transcends a particular competence

Consequently, competence, interests, and the motivation of organizational members, and the strategies needed to support these rudimentary assets, within an organization, should possibly be considered as being *pivotal*, and thereby, critical, assets for the knowledge-based organization, and for the pace of its future expansion.

These issues, among other diverse aspects of competence management, suggest the need for innovative competence management strategies (CMS).

1.1 Background

In the age of *capital*, wealth was transferred from those who owned the land to those who controlled access to capital. Consequently, the *rich* were no longer the landowners, but rather those who were the owners of capital. "The ability to *finance* endeavors became the most scarce commodity of production." (de Geus, 1999)

Over the course of the twentieth century, Western economies moved through, and away from, the age of capital toward the age of *knowledge*. The scarcity of capital began to dissipate. And over this time period, with the ready-availability of capital, the crucial and

decisive production factor has now become a matter of managing human resource, i.e. competence management. (de Geus, 1999)

As the 21st century unfolds, and the age of knowledge solidifies its position as a key commodity on the world market, new IT innovations and strategies within the field of competence management continue to challenge information systems scientists and developers and urge them toward new technological frontiers to be pioneered.

Present-day trends toward the downsizing and streamlining of organizations place ever-increasing pressure upon management to optimize the competencies of their human resources, as well as their material and financial assets. But how can competence managers best facilitate this optimization?

Competence Management Strategies (CMS), as subject matter for this Master's thesis, was selected with the aspiration of providing complementary research information in the study, analysis, development, and refinement of competence systems employed in the field of competence management within knowledge-based organizations.

1.2 Previous Research

While many competence systems, in current use, are well-designed, they appear to oftentimes be relegated to serving as personnel administrative data depositories (Lindgren, Wallström, 2000; Lindgren, 2002), devoid of the critical and crucial interest-driven dynamism required to best serve the competence management requirements of innovative 21st century knowledge-based organizations. That is to say, organizations have focused primarily on the documentation and management of organizational knowledge, and on organizational expertise in that particular domain (Stenmark, 2002).

Two examples of recent research work conducted in the field of competence systems and competence systems development have been published in two separate doctor dissertations in 2002, one authored by Rikard Lindgren, Ph.D. in Informatics, and one authored by Dick Stenmark, Ph.D. in Informatics, both at Göteborg University, Göteborg, Sweden. While Dr. Lindgren's work focused on a range of competence systems and Dr. Stenmark focused on Intranet use, as a tool in knowledge management, the contributions of these research results provide clear and vital implications for competence management. Both these publications are presented and referenced in this thesis.

Relatively little study has been conducted on the specific dynamics and requirements of competence management and competence systems. And what limited attention this domain has received has been heavily influenced by early 20th century management thinking. (Stenmark, 2002)

On reviewing literature in regards to formalized competence management strategies, such a concept to address suggestions or specific guidelines for strategic courses of action seemed to be wanting.

1.3 Research Question

What components are today's competence systems comprised of, and how can the use of competence systems be enhanced to provide even better support in the management of

organizational competence? On what strategy or strategies for competence systems development might future research focus?

1.4 Purpose

The purpose of this thesis was to examine the status, functionality, and effectiveness of an up-and-running competence system, using the Lindgren and Stenmark dissertations as reference material, to provide a basis for formulating a concept and suggestions for developing strategies to support and enhance the management of organizational competence. The research findings were then purposely utilized to produce talking points that might serve as catalysts to help stimulate discussion and suggestions for continued research on dynamic and innovative competence systems development.

1.5 Scope and Limitations

Time restraints (course duration: 10 weeks) played a decisive role, when considering the scope of the research to be presented in this thesis. This was the key-determining factor, and of particular importance, when setting research parameters, in regards to estimating the breadth and depth of research investigation, which could be accomplished in the time allowed. The endeavor was to provide a thorough and succinct overview of the selected research data.

Ultimately, the decision was made to limit this research paper to a discussion of a theoretically viable approach to competence management strategies (CMS) for competence systems. The TP/HR competence system and the VIP competence system prototype (both systems implemented at Volvo IT, in Göteborg, Sweden) were selected as research objects for this literature study. The findings of that research were used as a model on which to base the discussion and conclusions presented in this thesis.

No technical systems design specifications were analyzed or presented, and no design prototypes were built (for specific use in this study). Possible negative views toward or negative aspects of the approach to competence management strategies suggested in this thesis were not included or discussed in this paper. Research boundaries were set at - and limited to - the theoretical exploration of various aspects of organizational managers' interests and needs, as it pertains to developing competence management strategies.

1.6 Thesis Outline

The contents of this research paper are arranged as follows:

PART I THEORETICAL FRAMEWORK

Section 2: The Context of the Knowledge-Based Work Environment

FOCAL POINT: The aim of this section was to provide the reader with points of reference and key aspects, regarding the nature of knowledge-based organizations, in order to help define the environment in which concepts of competence and competence management are shaped.

Section 3: Concepts and Attributes of Motivation & Incentives

FOCAL POINT: This section explores some of the underpinnings of basic human behavior. As it relates to the concept of competence management strategies (CMS), there are intriguing theories on motivation and incentives, which are transferable into strategies useful for competence management.

Section 4: The Concept of Competence Management Strategies (CMS)

FOCAL POINT: This section introduces an overview of focal points in the concept of competence management strategies, based on the combined use of two complementary components (one natural and one artificial) to enhance competence systems development.

PART II METHOD

Section 5: Review of Research Methods

FOCAL POINT: A brief overview and presentation of the most prominent research approaches and methods used in research work was presented, to familiarize the reader with the types of research frameworks considered by the researcher.

Section 6: Choice of Research Methods

FOCAL POINT: The research for this study took the form of a literature review. As this theoretical study is based on previously researched material, both the research methods used for this thesis, and the choice of literature from earlier studies, referenced in this thesis, were presented.

Section 7: Presentation of Research Data

FOCAL POINT: Section 7 provides an account of the methods used by the authors of the research literature. It was deemed expedient to provide the reader with this detailed information, so as to highlight the reliability and the validity of the source materials referenced in this study.

PART III RESULTS - DISCUSSION - CONCLUSIONS

Section 8: Review & Analysis of the Research Data

FOCAL POINT: After having reviewed and evaluated the research material, the researcher focused on one standard software package for competence management, namely, Tieto Persona Human Resource (TP/HR), and on a prototype system called VIP. This systems combination provided the basis for the development of the concept of a competence management strategies mindset.

Section 9: Discussion of Research Results

FOCAL POINT: The insights gained from the research study are presented here. The discussion addresses the questions posed in the introduction section of this study.

Section 10: Conclusions

Section 11: References

PART I THEORETICAL FRAMEWORK

In order to articulate an approach to the concept of Competence Management Strategies (CMS), the components of the approach must first be defined. The following theoretical framework provides the basis for understanding the rudimentary aspects of these components. It is an intricate framework of intertwining concepts.

The research started with a review of the basic concepts of knowledge and knowledge management, competence and competence management, and other corresponding subject material. As the concepts of knowledge and competence share similar traits (e.g. they have both explicit and tacit characteristics or qualities), it was decided to contemplate *competence* (as the literature was being reviewed) in the same terms as *knowledge*. Interestingly enough, new insights began to emerge regarding how competence management resembles knowledge management, in a myriad of ways. (Sections 2.1 - 2.8).

Next, a couple of what seemed to be elementary, yet reasonable and plausible, questions were posed: How can we, as systems developers, access that information? How do we influence people (i.e. Are there strategies that can be developed to entice people) to divulge their inner thoughts, interests, and contemplation? Aside from immediate thoughts about previous research into systems development methodologies, thoughts also ran to previous studies in organizational management, and in theories concerning motivation (Section 3). The search might well be over. Three prominent theories on motivation appeared to indicate the answers to those two questions in simple "as plain as the nose on your face" terms: *Appeal to human nature!*

It then seemed logical to contemplate what information systems technology might have to offer that would support and facilitate the testing of this hypothesis. And again, the solution may well be found in human nature, or rather, in the mimicking of human nature, i.e. artificial intelligence.

Finally (Sections 4.0 - 4.3), these ponderings spawned the inspiration to construct an overview of focal points to introduce the concept of competence management strategies (CMS), by which these two "elements" (one natural; one artificial) might be merged and utilized to enhance competence systems development.

2 THE CONTEXT OF THE KNOWLEDGE-BASED WORK ENVIRONMENT

FOCAL POINT: The aim of this section was to provide the reader with points of reference and key aspects, regarding the nature of knowledge-based organizations, and thus, providing insight into how competence and competence management are shaped by this environment.

The following is a review of the basic concepts of knowledge and knowledge management, competence and competence management, and other corresponding subject material.

2.1 Knowledge

The term *knowledge* is often used interchangeably with the term *information* (as well as with the term *data*), within IT/IS research circles. Kogut and Zander (1992) view knowledge as a form of information. For them, knowledge that is transmitted ”without loss of integrity” is called information.

Stenmark (2002) suggests the existence of a *continuum*, along which data and information exist as two points. Han contends that when data and information is reflected upon, and ”made sense of, ...*knowledge* is formed in the mind of the interpreter”. He says that in order to constitute knowledge, a mental absorption of data and information must take place; or as he puts it, ”Knowledge...requires a knower”. This, then, would designate *knowledge* as the third point on Stenmark’s continuum.

Sveiby (1997) defines knowledge as the ”ability to act”. And in the context of knowledge management, Stenmark adds that knowledge need not be acted upon, in order for it exist, but as long as it remains inactive, it is of ”limited organizational value” (Stenmark, 2002).

In knowledge management research, a philosophy of pluralistic epistemology exists, underscoring the fact that there are varying expressions or types of human knowledge (Spender, 1998). However, Nonaka and Takeuchi’s (1995) discussion of and distinction between *explicit* and *tacit* knowledge, and even Spender’s (1996) augmentative suggestion of *individual* and *collective* knowledge, are of particular interest for reflection.

2.1.1 Explicit Knowledge

The general consensus among modern IT research commentaries is that *explicit* knowledge, quite succinctly expressed, is knowledge which has been ”captured and codified into manuals, procedures, and rules”, and is easily disseminated. It comprises the more objective, rational, and technical expressions or forms of knowledge. (Nonaka & Takeuchi, 1995)

2.1.2 Tacit Knowledge...

Tacit knowledge, in contrast, is that knowledge that exists *internalized* in the minds of humans, and cannot be easily articulated or expressed. It is first made evident when it is revealed through action. (Stenmark, 2002)

Polanyi, however, who first introduced the theory of tacit knowledge (1966/1998), does not subscribe to the aforementioned distinction. His theory distinguishes tacit knowledge as a metaphoric backdrop, against which all formulations of understanding are interpreted. It embodies foundational social and cognitive awareness. Subsequently, [tacit] knowledge is ever emergent, non-monopolized, and consequently, incomplete at any one point in time (Lindgren *et al.*, 2001).

2.1.3 ...equals Hidden Competence

In an organizational setting, tacit knowledge assessment can include the sum total of all ”experiences, mental maps, insights, acumen, expertise, know-how, trade secrets, skill sets, understanding, and learning” held by its members. This knowledge is embedded in the psyche of the individual or within the interactions of work groups, departments, etc. (Blackner, 1995; Turban & Aronson, 2001)

This said, one can immediately recognize the impending impact organizational *culture* (see Sections 3.4) has on the accessibility and activation of this invaluable intellectual capital. And in the context of competence management strategies (CMS), these are the aspects of tacit knowledge that we are interested in tapping into and bringing to the fore.

2.2 Knowledge-Based Organizations

There are two types of organizations, *rationalistic* and *innovative*. The former is defined as being well-suited for stable, predictable work environments, and the latter relates to a more ”organic” organizational form, in which the work environment is dictated by fluctuating conditions, unexpected problem situations, and other unforeseeable events, requiring staff flexibility and rapid action strategies. (Jacobsen & Thorvik, 1998)

One should point out, however, that these distinctive organizational forms are by no means exclusive to each other, but rather, both these forms can often be identified within one and the same organization (cf. Nonaka, 1994). For our purposes, however, we will limit our focus to the *innovative* organization.

Jacobsen & Thorvik (1998) describes an ”organic” (innovative) organization as having the following characteristics:

- Authority, control and communication; organizationally-structured into a network
- Work tasks continually re-defined and dispersed according to organizational needs
- The individual member’s roll in the organization is defined in general terms
- Trans-organizational communication occurs both vertically and horizontally, as needs dictate

That said, *knowledge-based* organizations are innovative organizations. Such an organization exudes characteristics consistent with those of an operational perspective, which views organizations as open and dynamic systems (Burns & Stalker, 1961). The knowledge-based organization, as a rule, has limited ability (if, at times, any ability at all) to predict future task requirements. The challenge is to be able to create and maintain a surplus inventory of innovative ideas to meet the demands placed upon the members of the organization to create new solutions. (Lindgren, Stenmark, Bergquist & Ljungberg, 2001)

To sustain operations and growth, knowledge-based organizations must continually cultivate competence among its members (Drucker, 1999), and safeguard the distribution and utilization of these competencies throughout the organization. (Cp. Ackerman & Halverson, 1998; Swan *et al*., 1999)

2.3 Knowledge Management

Knowledge Management (KM) generally relates to a number of procedural aspects in the utilization of organizational intellectual assets. However, the exact number of these aspects, and even their explicit representations may vary, depending upon whose standpoint one chooses to espouse. Alavi & Leider (2001) suggest that knowledge management is contingent on the use of at least 4 basic processes, those being: *knowledge creation, knowledge storage and retrieval, knowledge transfer,* and *knowledge utilization*. Other examples of earlier KM definitions found in research literature include:

- The generation, representation, storage, transfer, transformation, application, embedding, and protecting of organizational knowledge. (Hedlund, 1994)

- The increase of knowledge markets efficiency, by the process of generating, codifying, co-ordinating, and transferring knowledge. (Davenport & Prusak, 1998)

- The harnessing of intellectual and social capital, so as to improve organizational learning capabilities. (Swan *et al.*, 1999)

Noteworthy to mention is the formulation of one KM definition which lends itself to the theoretical research approach and focus of the planned research for this thesis, as it relates to organizational strategies:

- *The generation, accessibility, transfer, representation, the embedding, and facilitation of knowledge and knowledge processes, by developing an organizational culture that supports and encourages the concepts of organizational-value of knowledge, organizational-sharing of knowledge, and organizational-utilization of knowledge*. (Marshall *et al.*, 1996)

2.4 Organizational Memory

Before discussing organizational memory, there is an interesting aspect of organizational member interactivity worth mentioning, which actually concerns inter-organizational activities, but is applicable even in matters of inner-organizational activities, as well.

2.4.1 Organizational Learning (Turban & Aronson, 2001)

There are three methods of obtaining new external knowledge (Lane & Lubatkin, 1998): *passive, active,* and *interactive learning*. Passive learning occurs through technical knowledge resources (e.g. training, seminars, journals, etc.) Active learning takes place through organizational initiatives, such as benchmarking or competitor analysis. The more interesting of the methods, for our purposes, is that of *interactive* learning, where face-to-face (or in our context, user-to-user) interaction is needed in order to facilitate the assimilation of tacit knowledge. And in this exchange, organizational knowledge repositories, i.e. organizational memory, are of considerable value.

2.4.2 Organizational Memory

Organizational memory implies the storage, representation and assimilation of organizational learning. Hackbarth and Grover (1999) categorize organizational memory into 6 ”wells”, as Turban and Aronson metaphorically describe them; the idea being that members can ”drink” from these wells, and the wells themselves are perpetually replenished, such as in nature. (Turban & Aronson, 2001) The categories are:

- INDIVIDUAL WELLS
  -containing individual member information, e.g. files, reports, etc.

- INFORMATION WELL
  -formal information systems, e.g. a competence system

- CULTURE WELL
  -organizational ”beliefs”, i.e. shared basic assumptions (Schein, 1997, 1999). Such information can be assimilated both explicitly and tacitly.

- TRANSFORMATION WELL
  -contains frequently occurring business processes

- STRUCTURAL WELL
  -organizational structure information; both formal and informal

- ECOLOGY WELL
  -the physical structure of the organization

This collective memory can be effectively tapped and utilized in the creation and capture of new knowledge. As suggested by Hackbarth and Grover’s categorizations, communication and collaboration are vital processes.

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2.5 Competence

The still heavily prevailing rationalistic perspective on *competence* has its roots in the early 20th century principles of scientific management thinking, referred to as ”Taylorism”. Taylor (1911) developed a managerial tool, known as ”*Time and Motion Studies*”, and contended that workers’ competencies should be classified and simplified

into standardized sets of formulas, rules, and laws (cp. Sandberg, 1994; Jacobsen & Thorsvik, 1998).

Such classifications frameworks are static in nature and, at best, can only show the operational strategies by which an organization presently performs or by which it has performed in the past. There lacks a *trigger* mechanism capable of anticipating and satisfying future occupational requirements and/or needs of the organization. The focus is on the *task* being performed, rather than on the *individual* performing the task, and therefore hinders the possibility of organizational members making contributions to the organization beyond that of their present position. (Lawler & Ledford, 1992)

Even today, among knowledge-based organization members, the term *competence* seems still to denote a formalized set of specific roles and static job descriptions within an organization. However, for future expansion of innovative organizations, Lindgren contends that ”competence has to be associated with processes of change and should be seen as dynamic, emergent, and situated in constantly evolving practice” (Lindgren *et al.*, 2001).

2.6 Human Resource Management Approach

Contrasting the tradition of task-focused job descriptions, alternative approaches have been introduced which chart member competencies used in the *performance* of tasks. Lawler and Ledford (1992) introduced such an approach, as they believed that organizations should concentrate on promoting the *competencies employed* in accomplishing tasks. Instead of limiting one’s thinking to members holding specific jobs, the human resource needs of an innovative organization are better served if emphasis is place on regarding the member as a valuable knowledge resource, at the organization’s disposal. (cf. Lawler, 1994)

2.7 Competence Management

The primary thrust of competence management thinking seems to center around providing the organization with a time-and-resource accurate charted-representation of its members’ existing competencies. This information can then be used, for example, to survey how well the members’ competencies correspond to the competence demands of existing needs or “roles” in the organization. (Lindgren & Henfridsson, 2002).

Document repositories and data warehousing are examples of how static competence information can be stored and made retrievable (see Section 4.2.1, Data Mining), and by so doing, functions as the organization’s memory .(Ackerman, 1994). This augmentation or supplementation of an organization’s existing learning strategies or knowledge mechanisms has been the focus of numerous research studies. (Lindgren & Henfridsson, 2002) However, organizational approaches to competence management still rely heavily on a rationalistic, ad hoc view of competence. (cf. Lindgren & Wallström, 2000; Lindgren & Stenmark, 2002)

2.8 Competence Systems

Competence systems are a sub-group of knowledge management systems. Hahn and Subramani’s (2000) discussion of an area of knowledge management support referred to

as ”expert files and personal skills databases” would include these systems. Competence systems can be broadly described as systems which assist in the management of task descriptions and assessments, as they pertain to the individual members’ skills and level of competence, within an innovative organization, in such areas as programming, project management, job allocations, and the like. (Lindgren & Henfridsson, 2002).

Competence systems are generally structured as follows: An individual’s competence descriptions are stored in what are known as *competence trees.* These hierarchical structures house, in its top level, the categories which depict the various areas of organizational competence, e.g. ”*Tools*”, and for every subsequent sub-level, the individual’s corresponding competencies are displayed, e.g. ”*Programming Languages*” =>”*Java*”. Competence systems also support grade scale measurements, which denote the degree of competence, in a specific area, held by the individual; e.g. ”*Novice*” – ”*Limited Knowledge*” – ”*Experienced*” – ”*Expert*”. The systems normally store information for tasking purposes, as well. This function assists in allocating organizational human resources; e.g. the manning of a project team. (Stenmark, 2002)

One distinguishing feature which competence systems have (when compared with traditional expertise files applications and personal skills databases) is that they are designed not only to address daily operational needs of an organization, but they are also intended to support long-term projection perspectives. Another dimension of competence systems include the ability to survey possible deficits in both individual and organizational competence, by use of a systems feature that can perform what are known as *gap analyses.* These analyses are used to aid in pinpointing any resource or competence ”gaps” which may exist, or arise, between member competence and organizational needs, both present and future. (Stenmark, 2002)

2.9 Summary

Some interesting parallels can be drawn from this theoretical framework. *Explicit knowledge* bears similar traits to those of *competence*, as both are known and utilized assets in the knowledge-based organization. In like manner, *tacit knowledge* resembles the concept of *hidden competence*, as both are not yet accessed by, or available to, the organization. And just as in the case of knowledge management, the generation, access, and transfer of competence within the organization is of critical value.

Interactive learning, and the representation, storage, and assimilation of these learning processes, serve as vital source material. The human resource needs of the innovative organization thrive on the accessibility of these valuable commodities. It is the tapping of these “wells” (See Section 2.4.2) which points toward the need for an articulated strategy approach as to how competence systems can be maximized to address these needs.

3 CONCEPTS AND ATTRIBUTES OF MOTIVATION & INCENTIVES

FOCAL POINT: This section explores some of the underpinnings of basic human behavior. With the concept of competence management strategies (CMS) in mind, a wealth of information and insight which, when translated into strategies useful for competence management, comes to the fore here.

How does an organization tackle the question of engaging its members in matters of organizational knowledge and competence management? How is the subject of motivation or incentives generally been addressed? The prevailing concept of this issue is an extension of job-based organizational thinking: financial rewards for contributions made (Turban, 2001). However, that type of reward system hardly suffices in the knowledge-based organization, where motivational criteria other than pay-for-performance compensation systems (Jensen, 1998), per se, are generally valued higher.

Autonomy, commitment, and self-motivation are sited as three ”driving forces” when evaluating organizational members and their concept of what heightens their interest and motivation in their work. Not so surprisingly, the amount of interest in a given task or work assignment seems to correlate directly with the quality of the rendered result. (Lindgren, 2002)

It stands to reason, then, that creating strategies that help reveal key concepts or perspectives that can be utilized to spark interest in organizational members and motivate them toward greater commitment in organizational activities would be of great benefit to all.

3.1 Stenmark's Perspectives on "Information", "Awareness", & "Communication"

(Stenmark, 2002)

Dick Stenmark, one of the researchers cited throughout this thesis, has recently built and evaluated an intranet portal prototype, the Volvo Information Portal (VIP) at Volvo IT. Based on his research, he developed an interesting taxonomy regarding how knowledge-based organizations can facilitate greater use of in-house technology and foster better interaction between organizational members.

3.1.1 The Information Perspective

The information perspective is the most obvious view of the intranet, according to Stenmark. The idea being that both structured and unstructured information can be made accessible via an intranet, in the form of databases and documents. Stenmark refers to Nonaka and Takeuchi (1995) when he says that “access to rich and diverse sets of information” is of great importance for organizational knowledge creation, as it provides “rich stimuli, and the requisite variety, creative chaos, and redundancy needed for knowledge creation”. Mere access to information does not suffice. There needs to be space for reflection. And it is *that* reflection that enables us to “learn how to learn”, as Stenmark expresses it.

The information infrastructure provided by an intranet needs applications that complement this perspective on information by providing awareness and by facilitating

communication, thereby allowing organizational members to find each other and engage in dialogue. And this concept is readily transferable and applicable to the concepts of incentives and interest-activation in regards to CMS.

3.1.2 The Awareness Perspective

The idea here is to tap, and maintain, the awareness of the system users without subjecting them to information overload. There should be ways to link them with relevant and timely information at a pace and at intervals that suit the needs of the users. By being made aware of peers who share common interests, besides work-related issues, the establishment of communities can be facilitated, thus the opportunity for communication and collaboration.

3.1.3 The Communication Perspective

Here the interpretation of the available information is supported through providing system channels for communication, e.g. shared white boards, project areas, chat rooms. When people can collaborate with their peers - sharing like objectives; speaking the same language, as it were - the dynamics that foster knowledge creation and sharing are present, thus benefiting the organization, in the process. The system must therefore support organizational members' communicative interaction and provide means by which these communications and experiences can be documented. A holistic approach regarding these perspectives on information, awareness, and communication will bring greater knowledge management potentials to the fore.

3.2 Interest

The concept of *interest*, as the precursor and catalyst to the emergence of competence development, is being viewed more and more, in knowledge-based organizations, as a major asset (Nonaka, 1994, Stenmark, 2000), and therefore is an important focal point for study and development. Among other things, the challenge is to identify those individuals who display traits that would indicate the ability to learn "on the fly", and in even be capable of detecting and capturing emerging interests which, in turn, might well spawn the activation and realization of new competencies. (Lindgren *et al.*, 2001)

As the subject of *interest* relates to *competence*, a recent Informatics research study showed that competence is perceived as "complex and multifaceted". Three illustrative categories were presented: competence, as a formalized merit; *interest*, as a complement to competence; and *interest*, as it transcends a particular competence. (Lindgren, Stenmark, Bergquist & Ljungberg, 2002)

Hanefors and Undemar (2001) say that humans perceive reality based on their interests and on how they view themselves in relation to others. And in regards to the dynamics of competence management, they say further, that paying attention to these interests can support the discovery of "more elusive" tacit knowledge. In Stenback's *Designing the New Intranet* the following view is expressed: "*Interests* are instances of tacit knowledge, and *professional* interests, because they provide a natural incentive for actions, are useful from an organizational perspective" (Lindgren *et al*., 2001). This makes the concept of harnessing member interests a vital aspect of heightening motivation and creating incentives within the organization.

3.3 Motivation

It might be thought that there are an infinite number of concepts on what motivates human activity; countless reasons for why humans behave as they do. But according to leading researchers in both the fields of sociology and organizational management, humans seem to be fundamentally primitive beings; driven by only a hand full of basic instincts. Most theories are woven of a few common threads. (Jacobsen & Thorvik, 1998)

As it relates to theories on motivation and incentives within organizations, research has shown that both sectors of organizational members (managers and employees) have certain expectations about each other and about what motivates them in their work. In the mid-1960's, a management researcher by the name of E. Schein categorized several sets of managerial assumptions about employees (Carnall, 1990). These assumptions represent an interesting correlation between an organization's various work teams, and contributes to a useful empirical platform on which to theorize, concerning competence management strategies. Listed among the assumptions:

- People are fundamentally motivated by social needs. (cp. Maslow, 1943) They achieve a sense of identity through their relationships with others.
- The social pressures of peer groups elicit more response from employees than incentives from management.
- Economics is the prime motivating incentive for employees. Employees will pursue those activities, which offer the most economic benefit.
- There is no inherent conflict between self-actualization (i.e. competence development) and effective organizational performance. Given the opportunity, employees will voluntarily integrate their own goals with those of the organization, achieving the former by working towards the latter.
- People can adopt new motives as a result of their experiences, and hence the individual's pattern of motivation and relationship with the organization results from a complex interaction between individual needs and organizational experiences.
- People are complex and varied. They have many needs, arranged in a hierarchy of personal importance. But the hierarchy varies, as does motivation, over time and according to the situation. Their motives interact and form complex motivational patterns.
- People will respond to different management strategies dependent on their own motives and abilities (i.e. competencies) and the nature of the task. No single correct management strategy exists.

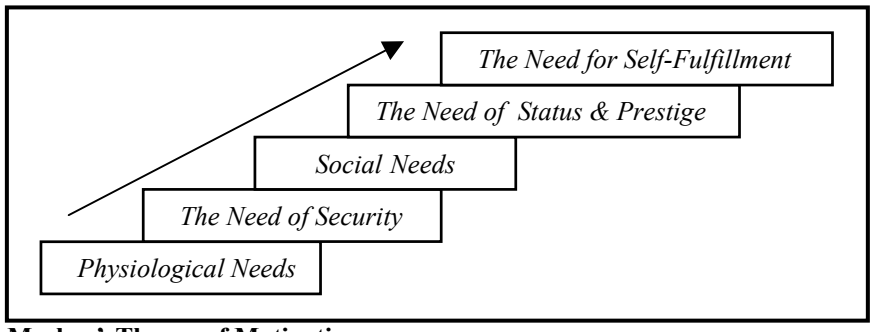
3.3.1 Maslow's Motivation Theory (Jacobsen & Thorsvik, 1998)

A. H. Maslow's *A Theory of Motivation* (1943) states that all humans have five (5) primal needs. His theory is premised on a 5-tier hierarchy, each tier representing a particular need, which influences our behavior. Theory: The need allocated to a higher-

ranked tier is not accessed or activated (and therefore does not influence behavior), until the need allocated to the tier beneath it is satisfied.

With "1)" representing the lowest tier in the hierarchy, the five primal needs are:

1) Physiological Needs, 2) The Need of Security, 3) Social Needs,
4) The Need of Status & Prestige, and 5) The Need for Self-Fulfillment



Maslow'sTheory of Motivation

3.3.2 The Theory of Expectation

In an interesting discussion on cognitive processes and motivation in the book, *Hur moderna organisationer fungerar* (*How Modern Organizations Function*), a "theory of expectation" is presented (Jacobsen & Thorsvik, 1998). In citing V. H. Vroom *et al.* (1964), they write (English translation):

> The Theory of Expectation studies the reasons behind great achievements. It is assumed that one's behavior reflects one's choice of goal and subsequent behavior one believes will result in that goal being achieved. Motivation is regarded as a function of the expectation that a certain behavior will achieve a result that the individual values and desires.

The main factor in the Expectation Theory is that humans are motivated to achieve a goal, if they: 1) value the goal, and 2) can ascertain that the goal is obtainable.

The value of the goal x the expectation that goal is obtainable = MOTIVATION

Motivation Formula

3.3.3 Alderfers' ERG-Theory (Jacobsen & Thorsvik, 1998)

C. P. Alderfer (1972) also categorized what he saw as fundamental human needs in a model showing the differences in priority. Alderfer's model could be viewed as expanding on Maslow's theory. The model illustrates three different types of need. Aldefer derived the name for his model by creating an acronym using the first letter of the words denoting each level of need.

- **E**xistence Needs – the pursuit of survival, and physical well-being (cp. Maslow's "Physiological Needs")

- **R**elatedness Needs – the pursuit of social relations with other humans (cp. Maslow's "Social Needs)

- **G**rowth Needs – the pursuit of personal development (cp. Maslow's "Need for Self-fulfillment")

What is interesting about Aldefer's theory is that unlike Maslow, Aldefer believed that these needs exist on a continuum and that one could, therefore, move freely across this continuum in either direction, at will. That is to say that having one unsatisfied need doesn't necessarily preclude that an individual might not still be drawn in another direction, motivated by a different need. This is an important point. It shows how even social and/or cultural background can be a motivating factor in the choices one makes. The inability to satisfy one particular need might well prompt or motivate an individual to place more attention and effort on successfully satisfying a different need.

Research concerning motivation in the workplace (Luthans, 1995) supports Aldefer's theory. The ERG-Theory has also proven itself useful in charting the kinds of needs organizational members exhibit at a given point in time.

3.3.4 McClelland's Motivation Theory (Jacobsen & Thorsvik, 1998)

McClelland (1966) goes a step further and says that humans can be divided into two groups: a small group of individuals who are drawn to challenges, and who don't mind exerting themselves in order to meet them; and the larger group (the majority) who really aren't that motivated. The question is how to explain this divide. McClelland believes that there are three types of need influencing motivation:

- The Need for Power

- The Need for Social Contact & Affiliation

- The Need for Achievement

Common for these three needs is that they are all *learned*-behaviors. In the book *Human Motivation* (1990), McClelland described these behaviors as follows:

- Persons with a need for power generally want to influence and control others. They are drawn to situations that render status and prestige, e.g. positions of leadership. Among other things, they are usually good communicators.

- All humans seem to exhibit a need to *belong.* Persons with a strong need in this area tend to endeavor to be liked by others. They usually try to avoid conflict, and they don't take criticism or rejection well. Early research (1930's) revealed that people in organizations feel a great need to be accepted by colleagues, and this points toward the importance of how group norms and social relations develop among organizational members.

- Persons driven by the need to succeed are usually quite creative, given the chance. Characteristically, 1) these individuals seek out challenges and are drawn to situations that require the undertaking of personal responsibility; 2)

they place high, and most often realistic, demands on themselves, and go all out to reach their goals; 3) they take only ”calculated” risks, and try to avoid unnecessary risks by analyzing situations well; and 4) they need quick and concrete feedback on their undertakings. They are not interested in how they, personally, are regarded, it’s the satisfaction of having accomplished a goal that is the primary focus for them.

3.4 Organizational Culture (Turban, 2001; Jacobsen & Thorvik, 1998)

As all humans share, and are driven by, a few basic instincts, it stands to reason that this commonality becomes easily transportable and transferable into any number of social settings, the workplace included. The end product of these processes of socialization is generally referred to in terms of *culture*.

Turban (2001) refers to Schein when he says that an organization’s ”ability to learn, develop memory, and share knowledge is dependent on its culture”. Schein (1997, 1999) describes *culture* as a collection or pattern of agreed-upon basic assumptions (Section 3.3). This process of socialization is, as with any other culture, *learned*. And as it is a learned behavior, it goes to reason that information can be assimilated among individuals belonging to that culture more effectively, as each person has similar expectations, and shares similar values, as the next. And as an organization learns more and more about itself (about what works and what does not work, within its environment), it, over time, cultivates a system of norms and standards that then becomes the *organizational culture*.

The concept of *culture* is, in principle, synonymous with that of a klan. The term *klan* was introduced into the field of sociology by E. Durheim (1933) as describing a group of individuals who are emotionally united by a feeling of circumstantial connection or a strong sense of solidarity. This translates easily into the organizational environment, where the goals of the individual become, in many ways, secondary to the organizational members’ collective focus on the aims of the organization. Organizational culture can, therefore, be a powerful tool in strategy planning. Understanding the socialization processes at work among its members, the organization can better decipher why, for example, a particular management decision did not product the desired or expected result.

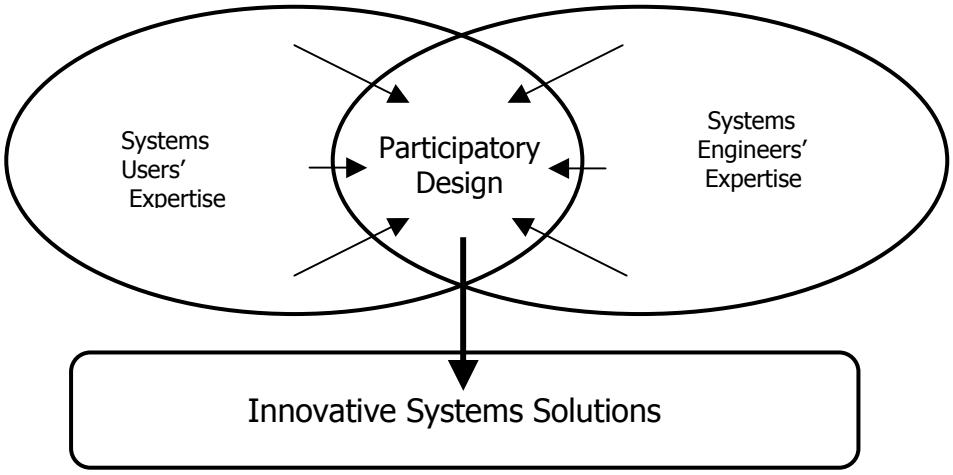
In terms of systems development, the failure of a technology implementation is generally caused by a misinterpretation of the organization’s culture. ”This is especially true of knowledge management because it relies so heavily on individuals contributing knowledge to the repository” (Turban). The point being, the organization succeeds or fails on the merits of how well it can formalize its culture and on how effective it is in capturing the collective ”emotions” of its members. It is by so doing that the organization can harness and channel and translate these dynamics into additional human and capital assets.

3.5 Participatory Design

One innovative way of harnessing and channeling the dynamic energy that is ever-present in the knowledge-based organization is to enlist its members as collaborative partners in the organization’s systems development process. What better way to support interest-activated member communication and collaboration, and to engage and motivate

competence development, than through hands-on involvement in the development and/or enhancement of the organization's competence management system.

Participatory Design is a collaborative process. The idea, of course, is to join systems users, who are experts in their occupational domains, with systems designers, the experts in computer technology, to create new and innovative systems solutions; the goal being, to improve system usability and the overall quality of the work experience and environment.



3.5.1 Definition

Participatory Design (PD) is a methodology in which representative systems users provide continual feedback to computer systems designers during the development of system prototypes. This collaborative team of people represents the major stakeholders in a product or system design effort. By bringing these "domain experts" together, a vital link is established where users can interact directly with designers in the development process, with their suggestions for product improvements before those suggestions are codified into a program. The intent is to create designs that reflect the way the systems users actually use the product in their work. (PDC, 1998)

3.5.2 Philosophy

Reich (1997) writes:

> Design can be interpreted as a product or a process. As a product, it is an object that was conceived and realized in the same way. As a process, it is the sequence of events from conception to realization of the design object.
>
> **Premises:**
>
> - We are all designers and customers - producers and consumers of design.
> - Design is a social process.

Conclusions:

- In almost every activity there is a design aspect.
- Social processes permeate our activities.

Participatory Design is the antithesis to traditional design. Design knowledge exists in all those potentially affected by a design, and they can all contribute to design a better product. This is carried out in a social process of communicating, sharing, reconciling, and acting.

Magnusson (2001) quotes Löwgren and Stolterman's *Design av informations-teknik* (The Design of Information Techniques):

> Participatory Design is a process of mutual instruction, where designers and end users learn from each other. The more one shares a social and cultural back-ground [environment], the more one shares a language, the more one participates in the design process. Participatory Design demands not only that end users share in the design process, but also that the designer shares in [work situations]. (English translation)

3.6 Push/Pull Strategy

The principle concepts of these well-known and well-proven marketing techniques, though developed primarily for use in the promotion and sale of manufactured goods and services (Kotler *et al.*, 1999), can have a very interesting and practical application in CMS, as well.

3.6.1 Push Strategy

A promotional strategy wherein sales promotion and all other activities involved in the distribution and sale of a manufacturer's products is directed toward its customer base by means of a middle man, i.e. a distributor/wholesaler, who in turn, creates a demand for said products by "pushing" the products onto the customer.

3.6.2 Pull Strategy

The promotional strategy wherein sales promotion and all other activities involved in the distribution and sale of a manufacturer's products is directed toward its customer base *directly*, thereby creating a demand for said products by "pulling" the customer into the distributor/wholesaler's facilities. This, in turn, creates a "pull" on the manufacture to meet the supply demands of the distributor/wholesaler.

The *pull* strategy is of particular interest here, in relation to competence management. The idea being that by reversing the "top-down" hierarchy in managing competence, the organization can directly act as a catalyst in creating interest and discovering new competencies through the facilitation of "lateralizing" interaction and communication.

3.7 Summary

This research has also given thought-provoking indications of a correlating link between basic human nature and the management of competence, and how this correlation can be utilized, strategically, in the support and enhancement of competence management.

There seems to be some primary sources of motivation for organizational members. Expressed interest in various subject matters may very well give indication of elusive tacit knowledge, or hidden or emerging competence (Section 3.2). But the prime motivator seemed centered around the need for interaction with others like one's self (i.e. social needs). Aside from this and other basic human needs, the sense of expectation or anticipation seems to play an important role in human motivation (Section 3.3).

Organizational culture (Section 3.4) develops through a sense of some mutual emotional bond with others (i.e. a klan). This is a learned behavior that occurs in a shared or common environment. And an organization can assist in the formalization of its culture by capturing the collective emotions of its members. One way to tap these resources is by engaging the members in the systems development processes of the organization (i.e. Participatory Design, Section 3.5), facilitating additional member interaction. And applying the concepts found in push/pull strategies (Section 3.6) can provide still other avenues of "promoting" organizational goals regarding motivation and interaction.

4 THE CONCEPT OF COMPETENCE MANAGEMENT STRATEGIES (CMS)

FOCAL POINT: This section introduces an overview of focal points in the concept of the development of competence management strategies, in which two contributing components (one natural and one artificial) are merged and utilized to enhance competence systems development. The concept centers on the use of advanced computer technology to cultivate, access, and assimilate new organizational competencies.

The new concept approach follows:

Competence must be seen as dynamic, emergent, and situated in constantly changing practice, and is therefore difficult to predict or define precisely (Stenmark, 2002) Communication and collaboration, then, become vital processes in an organization's quest to capture, manage, and utilize organizational members' competence. What is required are innovational strategies directed toward accommodating and facilitating this dynamism; both multi-leveled and multi-laterally.

"...People's commitment and motivation become crucial assets alongside technology's role of enabling new connections and possibilities in creating new competencies" (Nonaka, 1994). And it is this mindset that the concept of competence management strategies is intended to generate and support, among systems developers and competence managers, alike.

4.1 The CMS Approach

The choice to research into competence management strategies was made in pursuit of making a contribution to the continuous, evolutionary learning cycle regarding a new and broader approach to the subject of competence management by introducing new a new mindset and new terminology into the vocabulary of competence management - Competence Management Strategies (CMS) and CMS-Thinking - which, consequently, (it is believed) will further assist in facilitating added dynamism in future competence management systems development.

4.1.1 Competence Management Strategies (CMS)

COMPETENCE MANAGEMENT STRATEGIES (CMS) - The concept of Competence Management Strategies (CMS) is to attempt to uncover and identify - with the aid of dynamic computer technologies - those viable rudimentary elements and catalysts that can and should be harnessed and utilized to further the development and enhancement of competence management for knowledge-based organizations.

4.1.2 The Mindset of "CMS-Thinking"

CMS-THINKING

- the steering of competence development & direction
- the management of unstructured competence (tacit knowledge)

- competence status over time (dynamism)
- competence-sharing (motivational incentives)
- competence discovery (interest activation)
- hidden competence (disclosure reluctance)

These are the principal areas of concentration, regarding strategy development, and can serve as catalysts in the emergence of other correlating aspects of competence management development ideas.

4.2 Artificial Intelligence (AI) (Turban, 2001)

Artificial intelligence seems well suited to aid in accomplishing the goals and challenges expressed in the concept of competence management strategies. The use of AI as strategy development facilitator builds on the following aspects of this advanced technology:

Artificial intelligence is a term with many definitions. Most experts agree, however, that AI comprises two basic ideas:

- The study of human thought processes
- The representation of these processes via machines

A well-publicized definition of AI is that artificial intelligence is behavior by a machine that, if performed by a human, would be called intelligent.

Although there have been promising technological advances in the field of artificial intelligence, AI is still very much in its infancy. Nevertheless, even today's AI programs increase productivity and quality by automating tasks that require some human intelligence. Here are some abilities that are considered signs of intelligence, and that AI researchers are working toward mimicking via computers:

- Learning or understanding from experience
- Making sense of ambiguous or contradictory messages
- Responding quickly and successfully to a new situation (different responses; flexibility)
- Dealing with perplexing situations
- Thinking and reasoning
- Recognizing the relative importance of different elements in a situation

4.2.1 Data Mining

Data mining describes the process of discovering knowledge in databases; also referred to as *knowledge discovery*. The process is conducted automatically. Data mining tools look for patterns in data and may even infer rules from them. These patterns and rules can, in turn, be useful in decision-making and even forecasting decision effects.

Five common types of information can be retrieved by data mining:

- Classifications – infers the defining characteristics of a certain group
- Clustering – identifies groups of items that share a particular characteristic (non-predefined pattern-seeking)
- Association – identifies relationships between events that occur at one time (e.g. contents in a shopping basket)
- Sequencing – similar to association, except that the relationship exists over a period of time (e.g. repeat visits to a supermarket or use of a financial product)
- Forecasting – estimates future values based on patterns within large sets of data (e.g. demand forecasting)

4.2.2 Artificial Neural Networks (ANN)

The concept behind artificial intelligence is to automate human reasoning processes. However, AI tools have primarily been restricted to sequential processing and certain representations of knowledge and logic. A different approach to intelligent systems is to develop programs that mimic the processing capabilities of the human brain. The results:

- Knowledge representations based on massive parallel processing
- Rapid retrieval of large quantities of information
- The ability to recognize patterns based on historic material

ANN is the technique that attempts to simulate the thought processes of the human brain.

4.2.3 Intelligent Agents

There seems to be no commonly accepted definition for the term intelligent agent, but there are several traits or abilities that come to mind when people discuss intelligent agents. The main trait of an intelligent agent is that the agent is autonomous; that is to say that it is capable of working on its own, or of being empowered. It must be able to make decisions on its own, and it must be capable of altering its course or behavior when faced with obstacles and find ways around impediments.

Being autonomous, as agent takes initiative and exercises control over its own actions. Here are the four main characteristics of an intelligent agent:

- Goal-oriented – Accepts high-level requests from the systems users and is responsible for deciding how to satisfy the requests.
- Collaborative – capable of modifying requests, asking clarification questions, and even refusing to act on certain requests
- Flexible – Capable of choosing which actions to take, and the sequence of actions, in response to its external environment
- Self-starting – Unlike standard programs, an agent is capable of sensing changes in its environment and deciding when to act.

4.3 Summary

The use of intelligent agents, combined with data mining technology, provides a broad technology base for CMS-thinking and the structuring of competence management strategies. These technologies not only can facilitate the access and capture of data regarding interest activation or motivational incentives, but can also provide the means by which to store and retrieve data on, for example, competence status histories and competence developments over time. The ability to handle both static and dynamic data within the same system environment, facilitating broader support of competence management activities and system user interactivity, would prove to be a vital improvement in the area of competence systems development. And this is the principal idea behind the concept of competence management strategies.

PART II METHOD

5 REVIEW OF RESEARCH METHODS

FOCAL POINT: The following is a brief overview and presentation of the various prominent research approaches and methods to be considered when preparing to undertake research study. The purpose here was to familiarize the reader with the types of research frameworks considered by the researcher, before the decision as to the appropriate course of action was made.

Choosing a suitable research method, in preparation for an academic study is comparable to the algorithmic decision making process employed in any other procedural-based undertaking: building construction, automobile manufacturing, film development, clothing design; each of these processes depend on thorough and well-defined methodologies, and well-proven courses of action. Simply enough, it's a question of selecting the proper tools and strategies for the job at hand.

Careful and systematic analysis of the various research methods and approaches are key, of course. And once done, the determination of a feasible framework deemed most capable of yielding the highest quality of results possible is then made.

Before presenting an overview of the most prominent research philosophies and methods, here lists a number of the primary fundamental aspects of the academic research process (Nulden, 2002; Bergquist, 2002; Stjernberg, 2002; Zaring, 2002):

- The determination of "researchability"
- The study of relationships found between research objects (ex. people, artifacts, environments, processes)
- The study of how discovered relationships (or interactions) between these objects change, over time
- The discovery, charting and account of eventual contrasts between research objects, and the subsequent presentation and assimilation of new insight or knowledge concerning a given problem

With this as a common frame of reference, in regards to a research method's intended function or purpose, the following review is presented.

5.1 Research Tradition, Approaches & Methods (Easterby-Smith, 1991; Ranerup, 2002; Jan Carl, 2002; Bergquist, 2002)

There are two philosophical approaches as to how academic research should be conducted. Through the years, these two approaches have developed into two separate and distinct traditions: *positivism* and *phenomenology*. But there exists a paradox in that, in practical application, it is virtually impossible to conduct a research project without the

use or application of various components of both traditions, in conjunction with each other.

Easterby-Smith write that the end of the 20th century experienced a trend of shifting allegiance from positivism toward phenomenology. However, they point out that in the field of management research, researchers are rather pragmatic and opt to combine methods from both traditions.

The following is a concise presentation of these two traditions and their corresponding methods:

5.1.1 Positivism

Positivism is grounded upon the assumption that the world exists *externally*, and that its attributes and characteristics ought to be measured by applying *objective* research methods, whereby the untoward effects of researchers' subjective influences, on research results, are eliminated. That is to say, knowledge is relevant only if its emergence is the result of objective observation.

Among the central aims:

- The objective observation of the world (the researcher being completely isolated away from the research environment)
- The identification of patterns or variations in research material
- The demonstration of the credibility of diverse hypotheses
- The collection of facts by use of quantitative methods of measurement (operationalism)
- The charting of the primary aspects or elements in a given area of research (reductionism)
- The ability to draw generalized conclusions about research results by use of large research sample groups

A *deductive* research approach is usually used in positivistic research projects. Using this approach, the researcher constructs hypotheses regarding cause and effect, with the help of cited theories. Data is collected (often using quantitative research methods), and the material is then analyzed and tested against these hypotheses in order to ascertain whether or not the hypotheses can be deemed true. This approach is referred to as the "scientific" method.

Easterby-Smith discusses four quantitative methods for the collection of research data: *interviews, observations, tests and measurements*, and *surveys.*

5.1.2 Phenomenology

The other research tradition, the hermeneutic approach, emerged and developed to contrast to positivism, and contends that the world is "socially-constructed" and subjective, and therefore, is influenced by and retrieves its significance from its inhabitants. The role of the phenomenological researcher should therefore be to understand and clarify why a given experience occurs, rather than to search for external causes or contrived axioms, in order to explain a certain behavior. The premise being that the human factor is the crucial link in all research situations. Although, it should be said that there are many variations on this theme.

According to phenomenological tradition:

- The observer (researcher) is himself a part of the observation
- The researcher ought observe a given situation in its entirety
- Several research methods ought to be utilized in order to establish varying vantage points of a phenomenon
- The clarification of meaning in research is the central focus
- The researcher should use small research sample groups, and investigate them, either in depth, or over time

An *inductive* research approach can therefore be regarded as contrasting the deductive approach. This type of research is conducted void of any preconceived theories or hypotheses. The collected material is analyzed and coded, after which, there it is searched for patterns or variations. The researcher then develops theories and/or hypotheses. This approach is usually applied in qualitative research. An example of such a research method is *ethnography* (see Section 3.3).

Data collection using qualitative methods includes *interviews* (especially, *in-depth* interviews), *observations*, and *diaries. Surveys*, being quite useful quantitatively, are used in qualitative research settings, as well.

5.2 Methods of Data Collection (Easterby-Smith, 1991; Ranerup, 2002; Stjernberg, 2002; Johnsson, 2002; Jan Carl, 2002; Bergquist, 2002; Nulden, 2002)

5.2.1 Interview - used in most types of research, in various formulations.

Interview structure includes:

- Open Questions - the interviewee gives his interpretation of a phenomenon
- Structured Questions – the interviewer defines the parameters of discussion, and/or
- Semi-structured Questions – a hybrid of both open and structured questions

Interviews are useful in a variety of research situations; for example, in collecting facts, or in charting a decision process. They can be in-depth in nature, as in those instances when time permits and respondents are few in number, or they might be used more sparingly, as when there are many interviewees who make up part of a large survey or observation setting (in that case, referred to as *"Quick and Dirty"* ethnography. See Section 3.3).

5.2.2 Observation – often used in ethnographical research, but is made use of in other research settings, as well. The object is to study what people *do*, as opposed to what they *say* they do. Observation can be used as a positivistic method (the researcher being an isolated non-participant), or as a hermeneutic method (either the researcher is a non-participant presence among those being observed, or, the researcher is himself an active participant in the on-going observation (in which case, it is referred to as *action research* (see Section 5.2.2.1 Action Case Study); the operative word being, *intervention*)).

5.2.2.1 Action Case Study (Braa & Vidgen, 1999)

When the researcher's intentions go beyond the mere observation, comprehension, and interpretation of a problem area, and include intervention and change during the observation period, the concept can be described as a hybrid research method; a cross between *action research* and *case studies*, i.e. an action case study.

5.2.3 Tests and Measurements - a quantitative technique used to chart patterns or variations in researched material. Statistic data exemplifies the different types of numerical results produced using this research technique. Types of techniques employed include:

- Variables - a qualitative characteristic is given a numerical value, which can vary
- Scales - includes four different sets of evaluation scales
- Population - random choice (with or without use of probability theories)

5.2.4 Survey - primarily a quantitative technique that functions just as well in qualitative research. Uses the same types of data input as used in tests and measurements.

5.2.5 Diary - a hermeneutic tool that can yield both quantitative and qualitative data. The researcher can chart different courses of events as well as identify any statistical patterns in the material.

5.2.6 Literary Study - generally any choice of research method should be preceded by a literary study. When a desire exists to research a given problem area or a given question, one has an obligation, according to Nulden, to investigate any earlier research work available, concerning the chosen problem area. The researcher should determine if the question(s) he/she intends to ask has already been answered by earlier studies. The research can also ascertain if any previously-gathered, and/or previously-analyzed, data is available, whereby

saving valuable time and resources. “A literary study also assists a researcher in synthesizing [earlier knowledge] and gaining new perspectives”.

5.3 Ethnography

The origins of ethnography stem from anthropology, ethnology, and sociology. Within systems development, there are several forms of ethnography commonly in use. Hughes *et al*. (1994) presents the four major types of ethnography in this field:

- *Concurrent Ethnography* - systems development and the ethnographical study are conducted simultaneously, until the researcher(s) have collected sufficient material.

- *Quick and Dirty Ethnography* - a short ethnographical study is carried out, as to provide the researcher(s) with a general overview of the chosen research environment.

- *Evaluative Ethnography* - the study is used for the verification and validation of previous-formulated design decisions

- *Re-examination of Previous Studies* - earlier ethnographical studies are reviewed, with the intent to provide new ideas or innovation for previous design concepts.

5.4 Trustworthiness in Research

Reliability – measures how well the object of measurement has indeed been measured. The research setting should be able to be re-created and duplicated, and it should yield the same results. In terms of instruments of measurement, reliability is an indicator of stability.

Validity – addresses the question of whether or not that which was intended to be measured, was indeed measured. In essence, has the pertinent information sought been obtained?

The terms *reliability* and *validity* were originally applied to quantitative research settings, and there are several different methods by which both can be assessed. They are perhaps, however, not as easily applied in qualitative research. After all, the hermeneutic philosophy does not view the world in absolute, or solely objective, terms. Thus, precise measurements are difficult to obtain (Wiedersheim-Paul & Eriksson, 1997) However, Easterby-Smith says that these concepts are applicable qualitatively, so long as the researchers strive for the representation and presentation of interpretations and perspectives, other than solely their own.

6 CHOICE OF RESEARCH METHODS

FOCAL POINT: In this section, the researcher's choice of research methods is presented.

The research for this study took the form of a literature review. As this theoretical study is based on previously researched material, both the research methods used for this thesis and the choice of literature from earlier studies referenced in this thesis are presented below. The findings of all the materials presented in this study were based on the use of the phenomenological tradition's qualitative approach.

It should be noted that, as previously discussed in Section 5.1, it is not always an easy task drawing clear lines of distinction between the methods and approaches used in qualitative research processes. And in this instance, as well, there are possible overlaps in the research methods employed. Albeit, the intention here is to provide as concise a representation of the research process as possible.

6.1 The Research Method Used in This Study

The concept behind competence management strategies (CMS) is that this research is an evolutionary, iterative information systems development process. It is algorithmic in nature and, therefore, reliant upon basic knowledge management theories and concepts, and on previously-formulated (or previously implemented) design innovations as a basis for development. Consequently, the methods employed in the research for this thesis were as follows:

6.1.1 Literature Study

A broad and thorough review of available literature on the subject of knowledge management and competence management was conducted. Literature pertaining to such disciplines as organizational theory and organizational management was also included in the study.

The primary sources of the literary material came from library reference books and course literature; along with distributed reference materials and/or personal notes from various Informatics seminars and discussion groups; the majority of which being provided at the university. The number of internet references are at a minimum, partly due to the fact that the available print materials were deemed sufficient for the task at hand, and partly in an effort to safeguard the reliability and validity of the research as much as possible.

6.1.2 Ethnographical Study

The goal of this thesis was to present innovative new perspectives and ideas, regarding the development of strategies, to enhance an expanding area of competence systems development. It was decided, therefore, that the most economic use of both time and resources would be to concentrate efforts on a ***re-examination of previous studies*** in the field of competence systems.

6.2 The Research Methods Used in the Previous Studies

Two Ph.D. dissertations were chosen as the primary sources for the previously-researched material used in this thesis:

- *"Competence Systems",* by Rikard Lindgren (2002)
- *"Designing the New Intranet"*, by Dick Stenmark (2002)

These two publications comprise a total of 11 research studies on competence management and competence systems. While data and information was provided through the study and review of these two volumes in their entirety, this researcher chose to use two of these studies, in particular, as focal points; as a basis for analysis and discussion:

- *"Using Competence Systems: Adoption Barriers and Design Suggestions"* (R. Lindgren & O. Henfridsson, 2002)
- *"Designing Competence Systems: Towards Interest-Activated Technology"* (R. Lindgren & D. Stenmark, 2001)

7 PRESENTATION OF RESEARCH DATA

FOCAL POINT: Section 7 provides an account of the methods used by the authors of the literature, when collecting research data for their empirical analyses and evaluations. As this current study was based on the findings of their research, it was deemed appropriate and expedient to provide the reader with detailed information, so as to underscore the reliability and the validity of the source materials referenced in this study.

7.1 The Lindgren/Henfridsson Research (Lindgren, 2002)

A multiple-case study was conducted by Lindgren & Henfridsson (2002), consisting of two main components: a technology review, and a ”user site investigation”. The technical analysis provided an overview of unique system features, while the site investigation offered a context for understanding the functionality of competence systems in practical knowledge work settings. The complementary aspects of these two approaches provided tangible suggestions (to the authors) for the future design of competence systems.

The sources used in data collection for the technology review included system manuals, a pro-active examination and evaluation of the systems, system use observations, and participation in educational sessions and a system features workshop.

Lindgren & Henfridsson investigated the following competence systems:

Three standard software packages:

- Prohunt Competence (Prohunt)
- SAP R/3 Human Resource Competence Module (SAP R/3)
- Tieto Persona Human Resource (TP/HR)

Two in-house designed systems:

- Compass (developed in-house by Frontec)
- Competence Marketplace (developed in-house by Guide)

The user site investigation included evaluating the systems environments of six different organizations. These organizations were chosen due to their emphasis on competence management, and because of their routine use of competence teams. The investigation was conducted during a 10-week period, during the summer of 1999, and was comprised of the interviews and observations of three participants at each location. Twenty-four semi-structured interviews were carried out; each lasting 45-60 minutes. Subject matter ranged from work practices and competence, to competence development and competence systems. A qualitative approach was used when transcribing and analyzing these interviews. Recurrent themes were identified for further analysis. Care was taken to select participants with extended experience and knowledge. This study included individuals who had ”good insight” into competence management activities, due to their respective role in their organizations, and/or their interests. These people included consultants, consultant managers, account managers, HR representatives, HR managers, project managers, and CEOs. The results of this research were presented and discussed in two workshop sessions (focus groups) to validate the findings.

As aforementioned, use site observations were also used in collecting research data. These observations included active participation, on the part of the researchers themselves, in organizational competence management projects and in organization-specific competence planning.

7.2 The Lindgren/Stenmark Research (Stenmark, 2002)

An action case study by Lindgren & Stenmark (Stenmark, 2002), done at Volvo IT, corresponds with the research carried out by Lindgren and Henfridsson, as it uses the TP/HR system as a platform upon which they build a complementary competence management prototype system, called VIP, to better address some of the more dynamic aspects of competence management.

This was an 18-month study, which allowed the researchers an opportunity to observe those emerging problematic aspects of the system's functionality, unforeseen from the outset of its implementation. As one of the researchers was employed at the organization, the research team was afforded a unique "in-context" understanding of the research environment. Their goal was to heighten awareness and appreciation among organizational members of and for a "broader understanding of competence" (see Lindgren *et al*., 2001), and to provide insight into competence systems design capable of capturing these new concepts.

During the first six months, 10 seminars or workshops were conducted, involving the two researchers, their four assistants, and project leaders from Volvo IT. The time was spent cultivating a shared understanding of competence (through discussions and interaction), and setting the project agenda. The following six months involved the design, implementation, and evaluation of both the TP/HR and the VIP systems.

Feedback from the users of the TP/HR system was collected by way of 10 semi-structured interviews, which lasted 45-60 minutes, involving employees from different parts of the organization. Job positions included: management consultants, systems programmers, and HR personnel. The interviews consisted of topics similar to those included in the Lindgren/Henfridsson study: questions on work practice, competence, competence development, and IT support for competence management. However, in this particular study, follow-up questions were posed, as well. All interviews were recorded and transcribed. Site use observations also took place. And besides interviews and observations, data was also collected from archives and project documentation. This data was comprised primarily of strategy plans for competence development, and material on technical aspects of TP/HR.

Regarding the VIP system prototype, empirical data consisted of 16 semi-structured interviews with those organizational members having experience in using the prototype. The interviews were all approximately 60 minutes in duration, and were carried out after a 10-week test period. The interviews took place over a two-month period (May /June). The interviewees included personnel ranging from non-technical positions, such as HR staffers, project managers, department managers, and financial controllers, to technology watchers and systems programmers. Questions covered such topics as Internet and intranet applications, portals, information seeking, competence, and competence systems. And even here, all interviews were recorded and transcribed.

Stenmark remarks that by closely following the development of these two activities (the evaluation of the TP/HR system, and the development and implementation of the VIP prototype), they ”gained a thorough understanding of [the] capabilities and shortcomings of IT support for competence management, in an organizational context” (Stenmark, 2002).

The last six months of the project were used in the compilation, analysis, verification, and composition of the research results. During this phase, eight focus group meetings, involving organizational members, were held to assist in the verification process.

PART III RESULTS - DISCUSSION - CONCLUSIONS

8 REVIEW & ANALYSIS OF THE RESEARCH DATA

FOCAL POINT: After having reviewed and evaluated the research material, it was decided to focus on one of the standard software packages for competence management, namely, Tieto Persona Human Resource (TP/HR), and on the VIP prototype system. The reason for choosing this particular combination of systems was to demonstrate and emphasize the work processes with which an organization, any organization, could expect to build and implement a highly-viable customized competence management system, without having to start totally ”from scratch”, as it were, thus making such an important investment more economically feasible, saving both time and resource. By assessing the workings of this systems combination, this researcher was provided with a ”platform” on which to base the concept of a competence management strategies mindset.

This section outlines the empirical findings, as presented in the Lindgren & Henfridsson action research study of the TP/HR system, in use at Volvo Car Corporation (VCC), Volvo IT (VIT), and Volvo Truck Corporation (VTC); and as presented in the action case research conducted by Lindgren & Stenmark, at Volvo IT (VIT), which included the implementation and evaluation of TP/HR system and the VIP prototype system.

8.1 Review of TP/HR Technology (Lindgren, 2002)

This review provides an account of the proposed use of the system, as represented in the system documentation, general background information on the system, and an overview of the system’s technical features.

8.1.1 The Use of the System (Lindgren, 2002)

According to Lindgren & Henfridsson (2002), the TP/HR system is intended to broadly support ”competence management processes”. (This can be said of all the competence systems included in their research study.) Contextually, these processes can be described as those activities which focus on ”goal-directed administration, development and management” of organizational members’ competencies, as they relate to organization goals. The prime objective is the development and enhancement of these competencies, for both present and future corporate needs. TP/HR, as with the other systems, focuses on three key competence management processes:

- Structure and terminology development for competence work
- Competence level planning, development, management, and assessment, for an organization and its members
- Measurement and analysis of present and future competence levels

These processes are generally based on two types of analysis:

- Resource Gap Analysis
  This process focuses on mapping the relationship between resource and/or competence status and competence demand. The function of this analysis is to identify ”predicted demand and current supply” discrepancies in competence availability in an organization.

- Competence Gap Analysis

  Here, this analysis is used to indicate the level of competence, compliant with a particular work role profile, at which an organization member lies, and to what degree.

  This analysis is more defined, in nature, than the Resource Gap Analysis. It identifies competence gaps that may exist in an organization, at both the individual and organizational levels. Starting with a so-called ”activity plan”, key competencies, as well as role profiles, are defined as competence descriptions. These descriptions are then utilized to evaluate how well the competence of an organizational member corresponds to the competence demands of existing roles in the organization.

8.1.2 TP/HR System History (Lindgren, 2002)

Tieto Persona Human Resource (TP/HR) is a commercial software product, developed by a Swedish company: Tieto Datema AB. The system provides ”competence windows”, which can be customized to contain specific types of designated and defined competencies; e.g. background education, courses, and/or certificates. In addition, one can specify so-called ”local ”windows, if a certain competence is of vital interest to only those members stationed at a particular location in the organization.

Volvo Car Corporation, in Olofström, Sweden, implemented the TP/HR system in 1999, and during the 10-week action research study done by Lindgren and Henfridsson, TP/HR was being used to support the organization’s move toward becoming a ”process-oriented” organization. As an interorganizational project within the Volvo Group, both Volvo IT (VIT) and Volvo Truck Corporation (VTC) also implemented TP/HR for their competence management endeavors. Both these organizations have been analyzing the system’s work processes, and while VTC has already conducted a large-scale pilot, VIT has initiated and evaluated a pilot of its own.

8.1.3 TP/HR Technical Features (Lindgren, 2002)

One key characteristic of all competence systems, and is true of TP/HR as well, is that they provide descriptions and measurements of organizational members’ competencies in such areas/domains as programming skills, and project management experience. However, there are important differences between systems, in terms of the technical features included in them, and how these features interface practically with system users in daily knowledge work settings.

DeSanctis and Poole (1994) present a definition of structural features of technology, when distinguishing the particular nature of technical features. They define structural features as ”the specific types of rules and resources, or capabilities, offered by the system". It is their definition that has been adopted in this context. And it is this definition that dictate the range of action or functionality these features provide in any given competence system.

The selection of technical features presented were chosen out of a much larger range of system features, as they existed at the time of the action research study. They represent those deemed of relative importance, by the researchers, for competence management in organizational contexts.

Dedicated Client - The system uses a special client to access the competence data.

HTTP- compatible - The competence data is accessible through a web browser, internally or externally.

Sub-Systems - The system has more components that those described here, e.g. a recruiting system.

Competencies - Outlines how the system handles competencies. A competence denotes a certain or specific skill or position valuable to the organization, e.g. Java Programmer.

Roles - The system organizes role information. A role usually denotes a task to which an organizational member has been assigned, e.g. Project Leader.

Search - Facilitates the identification of specific competencies or roles.

Measurement - Provides competence status overviews.

Competence Gap - Identifies discrepancies between existing and desired competencies.

Resource Gap - Identifies discrepancies between existing and desired role resources.

Survey - Monitors competence status changes over time.

Competence Tree - Facilitates a hierarchical competence structure. As the title suggests, the structure resembles an inverted tree, which consists of top-level groupings which, in turn, have respective sub-level groupings. Each sub-level designation offers further definition of the proceeding level, e.g. Tool/Programming Language/Java.

Competence Grading - Denotes the level of skill, regarding a specific competence domain.

Free-Text - Facilitates manual input of comments and/or additional information into the system.

Individual Plan - Facilitates the expression of skill level ambitions and/or new interest domains.

Competence => Course - Directs the member to a course planning system.

Multilingual - Supports multiple languages.

CV Page - Facilitates CV-composition, tailored by the system database.

8.1.4 TP/HR User Site Observation (Lindgren, 2002)

Lindgren and Henfridsson's intention with their observations was to "identify barriers" to implementing competence systems in the practice of knowledge work in the studied organizations. They cite that the organizational implementation or "adoption" of information technology "can be very complex, despite seemingly sophisticated technologies" and the promise of intentions toward organizational change. In citing other researchers, they say further:

> Empirical studies show that issues such as reward systems (Orlikowski, 1996), organizational defensive routines (Henfridsson & Söderholm, 2000), and power structures (Markus, 1983) can work as impediments to successful IS adoption.
>
> While much of the existing literature covers barriers [present] primarily in [social contexts], our interest [here is in] how competence systems, themselves, can inhibit adoption.

From Lindgren and Henfridsson's qualitative analysis of the collected observation data, 8 "barriers" to the implementation of competence system in the observed organizations have been identified, and these barriers are described below, as they relate to the TP/HR system.

1) ***Confusion regarding the system's ability to correlate competence descriptions expressed both in free-text and structured form***

Although the system's *Free-Text* feature was intended as a complementary function to facilitate the qualitative aspects of competence expression, the parallel use of the two forms of representation (free-text and structured) apparently created problems in utilizing this function.

- One HR manager at VIT complained about inconsistencies in the use of the free-text and the structured-text functions. The users did not always mean the same thing in their descriptions. Another problem was that there was a lack of correlation between the two representation forms. Subsequently, a great deal of time and resource was required in attempts to update these various segmented competence descriptions. This fragmentation also impacted on the quality of information generated by system searches. All these problems made it less likely that members would be inclined to make use of the system. (Lindgren, 2002)

This demonstrates the obvious need for feature integration within this function. It goes without saying that this, along with the inability to make running updates, would

greatly impede a practical use of this potentially dynamic feature of the competence system, by system users or by system administrators.

2) The absence of system support in tracking staff availability

A recurring task within knowledge-based organizations is the manning of the various development projects. Team composition is highly dependent upon being able to access accurate and pertinent information regarding appropriately competent and experienced personnel.

- An account manager expressed concern about the problem of not being able to track the availability of staff members. Several colleagues re-iterated the same sentiment. They were all forced to rely on additional (other) information sources, as complements to the competence system, in this vital decision making process. (Lindgren, 2002)

3) The system's inability to store or display members' work task ambitions

Another recurring problem is the absence of a systems feature that allows for taking account of members' task interests and ambitions.

- The same account manager spoke of the frustration of searching the system for a person with a particular competence, and upon contacting that person, being told that that person no longer was interested or willing to provide the sought after competence. (Lindgren, 2002)

Inevitably, a project manning decision was based on the registered competence, rather than an individual's competence development goals. And adversely, members tended to "hide" existing, but for them uninteresting, competencies to avoid unwanted work assignments.

4) The system does not facilitate user-to-user contact

There are many occasions when individuals need to contact others within the organization, e.g. a person with a particular competence, but the system doesn't allow for it.

- VCC's Human Resource manager complained about the hierarchical and closed structure of the TP/HR system. This type of structure results in the user being unable to access any other profile than his/her own. The manager says that because of this system drawback, person-to-person contact by other means (other than using the TP/HR system) is the only option, when seeking to fill competency needs. (Lindgren, 2002)

This is a clear barrier to adopting competence systems. It was remarked by a number of interviewees that the closed structure was primarily a means of avoiding/preventing internal recruiting.

5) The lack of a system format for peer-to-peer interaction

The free exchange of experience and ideas, with one's peers, is a vital aspect of consultancy and project work. Such exchanges are often a source of motivation and inspiration for organizational members. But the needed feature to enable this type of interaction is missing.

- One project manager suggests the facilitation of peer-to-peer dialogue by means of an interactive forum. The importance of making such exchanges "easier" emphasized. (Lindgren, 2002)

6) The system's inability to analyze competence status on a group level

- A HR manager at VCC expressed concern about the inability to do team competence assessments, TP/HR only provides for competence level analysis on the individual level. (Lindgren, 2002)

The system does support analysis on an individual level quite satisfactorily, it was said, but the ability to use the system to form project teams and do group level competence analysis was nonexistent. Also, a request was made for the introduction of a feature that allows more "flexibility", when it comes to the analyses of competence status changes over time.

7) The need for further development of individual competence level description

Yet another important element in the competence management process is the mapping of organizational members' competence development. A crucial success factor in this type of development work is overseeing the management of individual interests and aspirations.

- One CEO saw this aspect of competence management as being complementary and important. It was voiced that if the competence system has a feature that addressed identifying the interests, aims, and directions of organizational members, the system would then be integrated into more of the organization's competence development activities. (Lindgren, 2002)

Here we observe how competence management should relate to future interests as much as it does to present and/or past skills and experiences, if not more. As noted earlier, system documentation of past experience is well supported, but the system does not accommodate competence descriptions complemented by individual interests, in any tangible fashion. The free-text feature provides the possibility to express interests, but as previously observed, this feature is not integrated with any statistical analyses for the compilation of such information into any instrument of interest or ambition visualization aides.

8) The integration of competence management activities with strategic business planning

There could be an invaluable resource benefit in an organization's ability to coordinate its competence management activities with those of strategic business

planning. There could be mutual benefit for both areas.

- To his previous comments the CEO adds that information regarding market trends (e.g. research, analyses, demands) would be useful to be able to access on the system, as well. This would facilitate more professional handling of organizational competencies. It was added that the absence of such a system feature curtails system use by top management and strategy planners. (Lindgren, 2002)

8.2 The TP/HR Project at Volvo IT (VIT) (Stenmark, 2002)

Initiated in June 1999, the TP/HR Project was in response to the need at Volvo IT to address the strengthening of their competence management activities. The two primary objectives of this system were:

- The identification of a competence structure which would facilitate the mapping of organizational members' competencies

- The implementation and maintenance of this structure, using the TP/HR system

8.2.1 The Implementation of TP/HR at Volvo IT

AT VIT, competence was divided into functional and technical skills, in the TP/HR system. *Functional* Skills denoted tasks performed by employees, e.g. *Application Development*, and measured how well the employee carried out the task. *Technical* Skills described the methods or techniques required by the task, e.g. *Programming Languages/Tools* or *Data Management*. These categories, in turn, had their respective sub-levels; comprising the same *tree structure* earlier discussed.

There were five levels of *competence grading*, where 1 = *no competence*, and 5 = *expert competence*. The system allowed for managerial searches for employees using the competence grade feature.

The system also hosted the features for measuring employee competence status, and for doing competence gap analysis. In contrast to the Lindgren/Henfridsson findings, VIT's TP/HR system supported competence gap analysis on both the individual and group level. At the group level, the system facilitated two types of analysis:

- *Group Analysis 1* – measured how well an employee's competencies matched the competence demands of each specific task

- *Group Analysis 2* – indicated how critical task-related competencies were distributed within a certain group

Volvo IT planned to utilize these features to support such organizational activities as resource and availability planning, internal and external recruiting, goal and development discussions, and other human resource functions, both short and long term.

8.2.2 The Evaluation of Volvo IT's TP/HR System

Four specific problem areas were discovered, after the implementation of the system, and were cited in the research findings. These findings are underscored by interview responses.

1) Competence Mapping

In the pursuit of a competence structure that would satisfy the needs and expectations of the entire organization, the researchers found that task to be daunting.

- A management consultant commented that there is a wide spectrum of competencies throughout the organization, and because of such diversity, it was difficult to create unified competency representations that would satisfy the varying needs and requirements of the entire organization. (Stenmark, 2002)

The heterogeneous aspects of VIT's vast organizational structure made it a challenge to construct one single competence structure, as different parts of the organization placed varying demands on exactly what competencies constituted the structure.

2) Competence Evolution

The longevity of a competence structure, once agreed on, was in question. The pace with which competencies became less viable and the rate at which new ones emerged made mapping these changes more difficult.

- A management consultant stated that in times past it was easier to chart individual competencies, as there change occurred at a much slower pace. But now, the rate with which technologies development and expand, an individual's competencies today says little about their possible aspirations for tomorrow. (Stenmark, 2002)

To cope with this evolutionary process, VIT established a maintenance team. But keeping updates accurate and current turned out to be burdensome. The reality was that mapping these changes tended to always be in arrears.

3) Competence Input

A system has no value other than its content, and that content has to be provided by someone.

- One HR manager, in discussing the problem of producer vs. consumer, as it relates to TP/HR, called the system a "tool for management". The point being made was that there needed to be some motivating factor for employees to divulge their competencies. They needed to play an active roll within the structure of the system. Otherwise, the success of the system would be impaired. (Stenmark, 2002)

TP/HR was primarily designed as a managerial tool for recruitment, resource planning and other such activities. While employees were expected to furnish the system with accurate competence information, the system provided little in return, thus leaving little, if any, incentive for participation.

4) Competence Isolation

As TP/HR was in fact designed to serve management, the system proved counterproductive in soliciting employee commitment to it.

- Referring to a previously quoted management consultant, the researchers re-iterate the problems posed by the closed, hierarchical structure. (Stenmark, 2002)

While managers were authorized to see every subordinate's competence profile, organizational members in other positions could only view their own individual profile. Consequently, the system could not be used for peer-to-peer communication.

8.3 The Inception and Introduction of the VIP System Prototype at Volvo IT (Lindgren & Stenmark, 2001)

When Volvo IT decided to implement the TP/HR system, the problems described above could not be anticipated. But once the system was indeed implemented and the ensuing evaluation undertaken, it became evident that the system was in potential danger of becoming a static data repository, in which increasingly inaccurate competence profiles were stored. This insight, the researchers say, provided an opportunity to "introduce and evaluate a technology, which, by being based on interest-driven actions, instead of formalized representations, contrasted the basic tenet of TP/HR" (Lindgren & Stenmark, 2001).

8.3.1 The Recommender System Approach

The concept of so-called *recommender systems* (RS) is based on the axiom that people, generally-speaking, rely on others with more experience to provide recommendations, regarding various typed of information (Resnick & Varian, 1997). Collaboration based on "word-of-mouth" exchanges (Shardanand & Maes, 1995) is a spontaneous human activity commonly used to inform friends or colleagues about issues or activities of potential interest.

The aim of early RS was to augment this social interaction, by assembling recommendations from more individuals than one might ordinarily come in connect with, and by so doing, increase "domain knowledge" and minimize bias (Stenmark, 2002). The problem of motivation, or incentives, faced by early developers, has been addressed in part by using methods other than obtaining these recommendations from the system user directly. One alternative involves engaging user-personalized agents to present the recommendations (Oard & Kim, 1998; Claypool *et al.*, 2000).

The fact that people share common tastes or interests has not explicitly been utilized by RS, in connecting users to each other. However, were these individuals accessing the same recommender system, it would be easy to automatically detect various similarities between them, as represented by their agents or profiles, and facilitate an introduction between them (Foner, 1996; Stenmark, 1999). Consequently, RS have recently been employed in the location and "leverage" of expertise within organizations (McDonald & Ackerman, 2000), and also in finding and communicating unarticulated knowledge (Stenmark, 2001).

Assimilating this knowledge and information, in conjunction with system enhancement indicators derived from the TP/HR evaluation, the VIP system prototype was implemented, as a complementary competence system.

8.3.2 The VIP Prototype

VIP was an agent-based recommender system built on Autonomy's AgentWare platform (Autonomy, 2000); a commercially available software tool that uses artificial intelligence (AI) techniques (neural networks & advanced pattern-matching) to identify textual similarities between different documents. The AgentWare toolkit includes a Dynamic Reasoning Engine (DRE), which is the proprietory neural network "black box", and a set of Application Programming Interfaces (API). The systems developer is then free to code the application and the user interfaces, as he or she deems necessary, and to include or exclude whichever system features, at will.

In this implementation, user-defined information agents search an index database for intranet documents matching the user's interest. Several agents could be defined and targeted toward different areas of interest. Interest definitions were described using "free-texted" natural language sentence structure, from which the system created an internal digital representation, i.e. a digital signature. Search results were displayed in list form, similar to that of most search engines, and by clicking on the associated hyperlink(s), the selected document(s) could be retrieved. What sets this system apart from an ordinary search engine is the AI neural network, which gives the user the ability to "train" and "retrain" the agent's search parameters. This is done, simply enough, by selecting the user-relevant retrieved document(s) and then clicking the "retrain" button. This explicit feedback to the system triggers the merging of digital signatures (the user-agent's and that of the selected document(s)) into a new signature, which is then substituted for the previous one. By so doing, the user can fine-tune the agent's search ability.

The use of a recommender system was intended to motivate *interest-driven* user-interaction. With the use of trainable agents, the process of document retrieval is made as effortless as possible for the user. It would, therefore, be in the user's own best interest to make use of and groom their agents, since a well-defined agent rewards the user with highly-personalized and highly-precisioned search results.

Another standard interest-driven feature, implemented in the VIP prototype, was that of *Communities*. *Find Users with Similar Interest* feature was, as the caption implies, intended to enables system users to locate colleagues who share similar information needs or interests. Here user-agent profiles were matched with profiles of other agents. The search result list displayed the particulars of the matched users, i.e. name, organization, department, geographical location, telephone number, and email address. The intention was to heighten awareness among organizational members, and thereby, bring about the emergence of online communities and informal networking.

In addition to these and other traditional RS features, the researchers suited VIP with a search feature: *Find Competence*. This feature, intended to aid the researchers in the study of "phenomena related to knowledge applied and enacted in work practice" (Stenmark, 2001), allowed free-text natural-language description of a specific interest. Whereas the *Community* feature aligned the user with others of similar interests, the *Find Competence* feature would locate a person having an arbitrary interest.

In contrast to general competence systems, such as TP/HR, which rely on pre-codified database records of standardized competence descriptions, the VIP system prototype based its results entirely on dynamically-detected actions and interactions of interest-driven organizational members.

8.3.3 The Evaluation of the VIP System

The interviewees, when discussing their views about and experiences with the VIP prototype, did so in terms of existing usage areas, and in terms of future enhancements of the system. The following is the findings, as presented by the researchers, so categorized:

8.3.3.1 Existing VIP Usage Areas

Those interviewees familiar with both the TP/HR system and VIP made the following comparison: TP/HR presented a rear-mirror view of competence, while VIP gave an idea of competencies utilized on a daily basis. They made particular reference to the dynamic system features *Find Users With similar Interest* and *Find Competence.*

- One HR staff member related their thoughts regarding the ability to locate members based on their actions, rather than on standardized formal representations of their competence. This system feature was referred to as being "sort of the next step" (i.e. progress being made), in comparison to the structure of TP/HR. (Stenmark, 2002)

VIP, by highlighting implicit roles, could also spawn the creation of communities or networks within the organization. The interviewees saw this facilitation of informal networking as something vital, as it is a prerequisite for cooperation.

- A project manager expressed surprise over the fact that networking, within an organization, was perhaps easier said than done. It seemed that members had far less experience and know-how, when it came to network building, than what the manager had expected. (Stenmark, 2002)

This manager saw how VIP could function to enable network building, and others shared this view. Still others saw the system's potential as a strategic tool.

- Another project manager thought that the *Find Competence* feature was of particular interest. It made the staffing of new tasks much less cumbersome. (Stenmark, 2002)

According to the interviewee above, HR planning might be one area where the *Find Competence* feature might be a useful tool.

- In addition, one technology watcher voiced how VIP might be utilized to visualize competence development over time. This feature was referred to as a potential mapping tool, where one could gain an idea of members' whereabouts, regarding aims, interest, and past experiences. (Stenmark, 2002)

The researchers note that "alongside facilitating analyses of existing and emerging competencies, the respondents also envisioned VIP as a tool for detecting competence gaps".

8.3.3.2 Future VIP Enhancements Suggestions

The interviewees discussed several areas related to both managerial and non-managerial activities, when asked about how the VIP system might be improved to better meet competence management needs.

- Several of them would have liked to have more detailed information on other organizational members than was currently available in the system. As VIP only provides for e-mail addresses, it was suggested that links to other pages, regarding additional information pertaining to the e-mail addressee, would be of interest. (Stenmark, 2002)

An interest in being able to access a deeper level of personal information was clearly expressed, understandably important, as the establishment of new contacts depends heavily on things such as trust and compatibility.

- A systems programmer complained about the limitations in the functionality of the intelligent agents employed by the system's *Community* feature. Once again, a request for a forum for peer-to-peer interaction was made. (Stenmark, 2002)

The interviewee argued that these agent results could assist in competence identification. However, VIP, in handling unstructured information, does not distinguish between levels of competence.

A different, but related, problem is that a member who has not defined an agent within he or her area of competence will not be identified as competence in that area.

- A HR staff member stated that they don't include their competence when training their agent, as it might not necessarily be the area of interest in which they want to seek out others. Thus, competence does not always indicate interest, or vice versa. (Stenmark, 2002)

While the discussion so far has centered on non-managerial activities, the following deals with managerial support:

- One interviewee complained that they view users' agents and gain information from that, but that they would also like to be able to ascertain how large an interest a particular topic generated, e.g. how many hits a certain topic got. (Stenmark, 2002)

- A technology watcher suggested that management could get a quick and flexible overview of the organization's competence status, if the automatic retrieval of this type of information could be enhanced. It would make it be easier to chart the overall direction of changing interests. (Stenmark, 2002)

- Others expressed similar ideas; for example, the ability to access an analysis of a person's agent; or the ability to calculate the amount of interest a person has for a particular topic by being able to count the number of agents one has assigned to that topic or count the number of updates done. These types of information seemed to be of great interest. (Stenmark, 2002)

These types of information, according to the interviewees, would provide a perspective on how different groups utilize their competence in practical applications.

Moreover, the system users viewed the lack of historic data in VIP as problematic.

- A technology watcher expressed how the agents' inability to retain historic information was a drawback. This impeded the ability to take a snapshot, as it were, of an individual's competence development. This in turn hinders the ability to obtain a record of developmental progress over time. The need for management to be able to access and store historic competence status information, and its importance, was also mentioned. (Stenmark, 2002)

8.4 Summary

The research approaches used by both Lindgren and Stenmark were quite similar in focus and scope. In their system observations, they both utilized interviews. However, the VIP assessment also included the use of focus groups in the verification of their findings.

Their studies of the TP/HR systems yielded similar results. The largest complaints centered on system functionality drawbacks, in such areas as competence input and competence mapping. However, the Lindgren study showed that there was a particular desire among the system users that he studied for peer-to-peer interactivity. It was interesting to note, as well, that both research teams did most of their research within the same organization. This may account for at least some of the similarities in research results.

The findings produced by the Stenmark study of the VIP prototype were of particular interest, because of the dynamism of this system; due to the use of artificial intelligence. Interesting enough, even with the added dynamics of agents, there were still complaints about the level of interaction available. Despite the months of system implementation preparation (See Section 7.2), the system seemed to fall short. It is not clear, though, if this occurred because of preset system functionality limitations or because the users became more demanding after the fact.

These systems evaluations have highlighted several of the central accomplishments in competence systems development, as well as underscoring some pertinent shortcomings. These are among the challenges that lay ahead for future competence systems researchers and developers. The sum total of all these various elements provides strong indicators for the need to conceptualize an orientation toward the development of strategies to address these vital issues.

The research findings gained through this literature review have provided valuable insights into many of the various aspects regarding design components comprising competence systems in use today. The findings have also illustrated how, when user-interactivity is introduced into competence system functionality, potential for increase in system use (prompted by interest-activation) is facilitated. In the discussion that follows, this and other aspects of the primary concepts of Competence Management Strategies will be explored.

9 DISCUSSION

FOCAL POINT: The concept of Competence Management Strategies (CMS) is to attempt to uncover and identify those fundamental elements and catalysts that could and should be harnessed and utilized to further develop and enhance what is clearly a vital concern, and an invaluable asset, for knowledge-based organizations; namely, competence management. What are some of these elements, and how can they be practically integrated into current and future competence management systems?

To elaborate on the concept of CMS, the following exposition has been divided into three major points for strategy discussions, in correlation with this study's research questions presented in Section 1.3:

- ***Section 9.1*** looks at the needs and requirements of the knowledge-based organization in order to meet its competence management demands (criteria), and how well the components of the researched competence systems currently meet those needs.

- ***Section 9.2*** discusses how organizational members can be a part of the support mechanisms employed to facilitate solutions to these needs (i.e. interest activation), thus enhancing competence management development efforts.

  (Plus pivotal factors in the accomplishment of these goals:)

- ***Sections 9.3 - 9.5*** focus on strategy-thinking, i.e. the tools and other resources (human and/or material) at the organization's disposal, and on suggestions as to how to achieve the maximum utilization of these assets

In the ensuing discussion, I hope to show how the combination of advanced computer technology and basic human instinct (perhaps seemingly paradoxical) can, in a variety of different constellations, provide competence management support (e.g. through interest-activation). The concept is that competence systems built to mine and refine organizational competence - including elusive hidden competencies of organizational members - can be dynamically structured and made inherently evolutionary, with the aid of innovative competence management strategies.

9.1 Organizational Competence Management Criteria

The findings from the studies of the TP/HR system and the VIP prototype have shown us already how computer technology can successfully and effectively capture pertinent and vital competence information.

However, the TP/HR was primarily a management tool for management level use. The general population within the organization received little benefit from accessing this system, as it was, in essence, a competence resource planning system. Therefore, the members, themselves, had no practical personal use for the system. So it wasn't so surprising to read a comment, in the research material, such as the one made by a HR manager at Volvo IT concerning a lack of motivation toward exposing one's competencies to the system.

This, in itself, created a significant problem for managers, in that they were dependent, to a large extent, on the subordinate members' system inputs in order to facilitate them (the managers) being able to carry out their duties and responsibilities. This resulted in there being a lack of competence information (and/or misrepresentations in available information) which, in turn, frustrated and complicated other aspects of competence management activities.

While TP/HR provided a vital function in recruitment and resource planning activities, the system had no feature that could actually track staff availability. This put competence managers at a yet another disadvantage. This meant that a different information system had to be referenced in order to retrieve this type of information. And this made for obvious data redundancy between these systems, resulting in additional time and resource costs. And yet another information system's content - business planning strategies - could provide pertinent information exchange benefits by having access to TP/HR's content. These and other gaps in information coordination and availability could be remedied by system feature enhancement or complementation in the TP/HR, or by systems integration (to be discussed later).

There was also the daunting task of developing a competence description structure that would satisfy the varying needs and expectations of an entire organization; and managing the system updates problems caused by the fact that competence is evolutionary by nature.

Aside from the various technical shortcomings in the competence system, the primary problem remained the collection of current and accurate competence information from organizational members. And that information could only be provided by the members themselves; thus one of the contributing factors that spawned the concept of the term *interest-activation*.

9.2 Organizational Members' Involvement in the Process

The use of a recommender system, on which the VIP system prototype was based, was intended to motivate *interest-driven* user interaction. Thus, the VIP prototype based its functionality entirely on "dynamically-detected actions and interactions of interest-driven organizational members". This helped to further promote innovative thinking and expectation (as Stenmark says he tried to provoke, with the *Find Competence* feature), among system users.

Upon researching Volvo IT's intranet (in conjunction with the implementation of VIP), Stenmark felt prompted to develop his taxonomy on an organization's perspective on the important of supporting the assimilation of information throughout the entire organization.

An information system should facilitate an organizational member's ability to not only access information, but also be contributors in the collection and assimilation of that information. The research results from the implementation of the VIP prototype clearly illustrated how having this type of accessibility fostered an added desire, among those organizational members testing the system, for involvement, interaction, and collaboration. For example, according to one of the participants, their interest for system use was heightened by the fact that the VIP provided a channel for identifying individuals

who shared similar interests. In addition, the desire for a forum where these individuals could also communicate with each other was expressed.

The research also demonstrated a clear correlation between several concepts relating to organizational member involvement in systems development (e.g. the concepts of participatory design and organizational learning through *interaction*, or motivational theorists' illustrations on the need we all share for social contact.), and the benefits that can be yielded. One such benefit could be, as we saw illustrated in the research findings, the exchange of ideas and information, i.e. tacit competence exchange, which could be "captured" and codified by a competence system (the information then being made *explicit*) and then assimilated into new competence management development and strategies.

As Lawler and Ledford's approach to human resource management suggests, viewing each member of an organization as a valuable knowledge *resource* can, as in the case of competence management, enhance considerably an organization's competence development potential. Just as organizational memory has been described in terms of "wells", in Turban's literature, competence systems managers and developers should "tap" the minds and memories of organizational members; themselves renewal and replenishable information resources, at the organization's ready disposal.

9.3 CMS Solution in Terms of Technology

The use of Artificial Intelligence (AI) technologies seems to be one of the promising advanced technological solutions in meeting competence management demands on information systems. Intelligent agents and data mining are two examples of AI technologies that fit these requirements.

9.3.1 Intelligent Agents

Why is the use of agents such an attractive choice of technology? I would venture to say that it is because of the flexibility in use, plus the sense of security that they provide. Agents are trainable, as the research has shown in theory and practice. They take on the characteristics of their "owners" and carry out directions and provide functional assistance as instructed, unassisted.

Another attraction, I would say, is the intrigue these "couriers" hold for the systems user themselves. As we have learned from this study, humans are social beings by nature. And as agents can in limited ways take on "human-like" qualities, system users can develop an affinity, as sorts, to them.

We, as humans, are naturally drawn to other beings, or things, in which we find "reflections" of ourselves. Think about it: our favorite TV soaps, ours pets, our friends and colleagues, our offspring - the ultimate reflection of ourselves. It then stands to reason that this instinctive human quality "kicks in", in similar ways, with regard to these "trainable" agents. We infer aspects of our own selves on these digital representatives, creating "reflections" that then draw us (i.e. interest activation). Food for thought, perhaps.

Now back to the topic of agents, themselves. Intelligent agents are applicable in all the instances and situations the research interviewees point out, for example:

- Charting user agent activity
- Tracking staff available
- Business strategy planning

I was once part of an Informatics course research lab team that had an assignment that included the training of intelligent agents. The project comprised of coding and implementing an agent prototype (using rule-based reasoning and back propagation techniques) whose task was to scan a chosen stock exchange website, evaluate the listings on that site, and then result a top-ten list of investment recommendations, based on our own criteria algorithms. A challenge, indeed, but highly rewarding tutorial in the learned behavior exhibited by this little "worker"; hands-on experience in the understanding of intelligent agent functionality.

9.3.2 Data Mining

Data mining operates similarly to intelligent agents, on the organizational level; another technology applicable in competence management activities. As this study showed, organizational memory is a vital part of any knowledge-based organization. And in competence management, data mining can be used to discover patterns and variations in data not necessarily, or readily, observable (i.e. "hidden" interest or competence) during the normal course of handling competence information; e.g. trends in competence interests, shifting attitudes in seeking or accepting certain job assignments, etc.

AI technologies are among today's most powerful and flexible systems development and systems enhancement tools at our disposal, in my estimation. They lend themselves well to the competence management needs highlighted in this study's research material.

9.4 CMS Solution in Terms of Human Interest Activation

Interest activation was a recurring theme in the research findings of the study. And it all comes down to understanding and utilizing basic human instincts, I would suggest. There is one point I think is important to make clear, however. I am not advocating the *manipulation* of those instincts, but rather the *exploration* and the *cultivation* of systems development "sensibilities", as to the workings of the human psyche and how we, as systems developers, can best maximize the benefits derived from this understanding, in our systems design work.

Basic human instinct is ever present in one form or another; within, as well as without, the organizational setting. We should be keen to remain aware of its impact and influence on all our decisions and activities. And if we can find new and innovative ways of fostering and channeling the "activation" of those particular instincts that can benefit organizational needs and goals, then we have assisted in creating added-value for an organization's intellectual assets.

9.4.1 Culture

Organizational culture plays a decisive roll in the direction an organization moves, and how quickly. Stenmark, as I mentioned earlier, talked about the relevance developing information systems that foster and support member information, member awareness, and member communication throughout an organization. It is the harnessing of all these concepts that can make the difference between success and failure in the cutting-edge world of knowledge-based business.

Knowledge-based organizations are teeming with people who thrive on challenge and have made it their prime ambition. It is a career choice (i.e. interest-driven), and as we are all too aware, an entire new industry has been built out of this "need" for achievement. Remember, Maslow's Theory of Motivation: the need for status & prestige, and for fulfillment; Aldefer's ERG-Theory's pursuit of personal development; and MacClelland's: the need for achievement? This is but one of the dynamics in play in the cultural development and evolution within as organization.

9.4.2 Collaboration

Another aspect of human interest activation involves what the motivation theorists describe as the need for association, affiliation, and security. Here, the building of organizational communities, and even informal networking, is a vital channel for the exchange of interests and ideas; a viable "growth" arena and the hidden nerve center for competence development and enhancement. And this is where the various systems development methodologies, e.g. Participatory Design, and the philosophy of user participation in systems design come in. Because, creating a sense of achievement for and among organizational members, spells achievement for the organization as a whole. We could see clear evidence of this dynamic, in many of the responses interviewees gave, e.g.:

- The importance of identifying interests and goals of individuals, thus providing more of an incentive to use the system
- Being able to locate others within the organization who shared similar interests
- The ability to obtain business strategy information, with particular focus on past track records and related competence status issues
- The incorporation of members' interests into work-related tasks, thus precipitating added momentum
- Being able to chart various aspects of development or progress for the individual organizational member; the direction of that progess; their interests or aspirations

There are resources here to be tapped and utilized. Make organizational members part of the creative process of competence system development and they will have an even more-invested interest in using the system and supporting it with information.

Remember the concept of marketing businesses' "push/pull" strategy? It's not always, nor only, the top-down (push) approach - simply putting an item on the market - that captures the attention, i.e. interest, of consumers (in our case, system users). Going directly to your target group with the product or service you wish to promote, and creating a demand for your product and having the consumer "pull" the product down through the production chain (i.e. interest-activated/ interest-driven) may be far more profitable for producers (competence managers).

And as McClelland's theory pointed out, those who are driven by the need to succeed are usually quite creative, once given the chance. They seek out challenges and are drawn to situations that require them taking responsibility; they place high, and most often realistic, demands on themselves, and they go all out to reach their goals.

9.5 CMS Future Research and Study

The system users voiced several varying requests and suggestions for improvements and enhancements, regarding the functionality of competence systems. For competence management and HR personnel, much attention was placed (understandably so) on activities such as competence charting, scheduling activities, and other similar organizational management needs. For the systems users themselves, primary interest (also not so surprising) was focused on user-interactivity, e.g. peer-to-peer system communication.

Using the research findings of this report as a "launching pad" for some brainstorming, here are but a few innovative suggestions for areas of future research regarding competence systems development that would aid the facilitation of competence management strategies. (*Bear in mind that any of the functions or features can serve multiple purposes*):

- ***Information Systems Integration (ISI)*** - the facilitation and enhancement of organization-wide information system compatibility to support e.g. competence information linkage between diverse or related KM systems/business strategy planning systems/user groups/target groups/etc

- ***Intelligent Agent Functionality***

  → *Document Retrieval (DR)* - enhancement of intelligent agent document retrieval

  ← *Document Delivery (DD)* - the ability of agents to deliver documents according to patterns, e.g. text-triggered delivery

  ↔ *Personal Information Dispersion (PID)* – agents serving as personal information couriers, e.g. digital signaturing that could include user-prepared personal profile information, or text-triggered work information regarding task or project involvement

- ***Competence Game Strategies (CGS)*** - the creation, development, and implementation of competence system-based organizational "game" activities for system users, specially designed to act as catalysts in creating new competence

interests or in testing, sharpening and/or enhancing current competence skills. *NOTE*: Game strategy designs should also support user-participatorial functionality to facilitate e.g. interest-activation, competence emergence, and interest discovery

Studies in such interdisciplinary fields of behavioral research as Cognitive Sciences, Human-Machine Interaction, and Sociology could prove very useful in helping to understand some of the processes and intricacies involved in formulating and developing flexible and varying competence management strategies.

10 CONCLUSIONS

The aim of this research study was to introduce the concept of formulating strategies for enhancing competence management activities, i.e. competence management strategies (CMS). The nature of knowledge-based organization makes it of prime importance that the competencies of its members can be channeled and utilized in such a way that this expertise provides maximum benefit to the organization.

There are interesting parallels, as this study has shown, between the attributes of the different aspects of knowledge and those of competence, and the necessity and use of both, in knowledge-based organizations. And just as in the case of knowledge management, developmental advances in the area of competence management are of critical value to these organizations' future expansion. The challenge is to invent innovative ways to exploit all of an organization's intellectual assets.

This study has looked at some of the underpinnings of basic human behavior. And as it pertains to the concept of competence management strategies (CMS), creating a link between organizational members' basic human nature and the management of competence produces a viable communications "portal" which can be utilized, strategically, in the support and enhancement of competence management.

Organizational interactive learning, and the historic value of these processes, serve as vital source material for a thriving workforce and could be facilitated through such a portal. A number of human resource needs of an innovative organization can be met through having the ability to store, access, and retrieve this vital information, with speed and accuracy. This calls for dynamic information systems and resource tasking strategies to meet such demands. This is but one example of an area of competence management activity that would benefit from an articulated strategy approach as to how competence systems can be maximized.

This study has revealed some primary sources of motivation for organizational members. Interest in a particular subject matter may be an indicator of hidden or emerging competence. And these interests seem to come to the fore, when members are provided with a vehicle for interaction. This correlates directly to the primal need of humans to interact with those with whom one has something in common (i.e. social needs). This interaction creates a sort of emotional bond, which is referred to as organizational culture. And as this study showed, an organization can assist in setting the parameters of its culture by capturing the collective emotions of its members. Other basic human needs, such as the need to excel or achieve, or the anticipation of reward or self-fulfillment, play an important role in human motivation. An organizational strategy to capitalize on these various dynamics could prove to be a major tool in helping to discover and develop new competencies. For example, the CMS concept of engaging organizational members in the very process (e.g. participatory design; push/pull) of developing such strategies addresses the some of these issues of interest activation, self-motivation, and collaboration.

The use of artificial intelligence technology and the tapping of basic human instinct are the premises for the concept of CMS-thinking and the structuring of competence management strategies. The ability to handle various forms of dynamic data within the same information system readily creates new avenues for future growth and development, for the

organization, as well as its individual members. And as stated earlier in the study, this is the principal idea behind the concept of competence management strategies (CMS).

Combining the dynamics of AI technology and interest-driven human interaction, as suggested in this study, carries with it the potential for perhaps unprecedented advances in the area of competence management for knowledge-based organizations. That potential, as this study has sought to illustrate, lies in the fusion of competence systems development and innovative competence management strategies (CMS).

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